EDITORIAL

THE United States Navy needs 8000 men for its aviation corps. Machinists, carpenters, blacksmiths, coppersmiths, and others with general mechanical experience are wanted.

PUBLICATIONS of the California State Mining Bureau are now available for reference and distribution at the branch offices of the Bureau at Los Angeles, Santa Maria, Taft, Bakersfield, Coalinga, and Santa Paula.

INDEX for the eighth volume of WESTERN ENGINEERING is now ready for distribution and will be mailed to all who desire to have their back numbers bound. Drop a line to the circulation department and the index will be sent by return mail.

MECHANICAL draftsmen are needed in many branches of the Government service. This is an opportunity to serve the country as definitely as on the firing line. Information can be obtained from any of the branch offices of the United States Civil Service Commission.

TIME is money but it is seldom that an exact value is assigned to it. This has been done for the passengers on the 'extra fare' trains of the Union Pacific system. When the train is more than two or less than five hours behind time, the passenger receives a refund at the rate of $1 for every hour's delay. When the train is more than five hours late, there is a $5 refund.

THE first annual report of the United States Shipping Board, covering its activities to October 31, has been made public. The Board is now supervising the construction of 1118 ships in 116 yards in different parts of the country. Wooden ships are being built when this can be done without interfering with the steel-ship programme, but the main efforts of the Board are devoted to the production of steel ships.

PLANTS for extracting toluol from artificial gas will be completed before February 1 by at least 175 public utility companies in the United States. Toluol is the most important constituent of trinitrotoluene. About one-twentieth of a gallon can be obtained from 1000 cubic feet of gas. The loss in heating-value of the gas caused by extraction of the toluol is negligible.

TRACING cloth, after being washed, makes excellent bandages and it is unfortunately true that the demand for bandages is likely to increase for some time to come. There are lots of old drawings in engineering offices that might just as well be used for this purpose. In addition, pieces of cloth left after trimming drawings are often large enough for bandages. The nearest branch of the Red Cross can use all the tracing cloth that you can send.

THE first division of the new Army motor trucks has been driven from Detroit at Atlantic Coast points, and it is hoped that deliveries can continue to be made in this way through the winter and spring. There will be 30,000 trucks in all, and, since only two trucks can be loaded in a freight-car, the success of this plan will liberate 15,000 cars for other uses. In addition, 90,000 tons of supplies of various kinds will be carried on the trucks, so that the total number of cars saved will be over 17,000. The plan will also help to train the drivers of the trucks.

INCOME-TAX provisions under the old law were such that the subject was one of purely academic interest to many engineers, but the new law is different. Even if you have provided yourself with an exemption you will have to make a return if your income exceeds $1000 a year. The amount to be paid will be small for any of those who were not tax-payers before, but the task of making out the necessary schedule is such as to dismay the inexperienced. Good news for such persons is contained in the announcement that representatives will visit all cities and towns to assist the new tax-payers in preparing their schedules.

THE need for economy in order to win the War has been impressed upon private citizens by many speakers and writers during the past few months. What sort of an example have public officials set during that time? An incomplete answer to this question is found in an investigation made by the Taxpayers' Association of California of the 'inside rate' of taxation in Californian counties. The 'inside rate' is the basic rate for general county purposes inside incorporated cities. All municipal and other special taxes are added to this 'inside rate'. Of the 53 counties in the State that levy an 'inside rate', 16 counties decreased the rate below the one set last year, 12 counties left the rate unchanged, while 25 counties increased it. Furthermore, increased assessments in many of the counties that lowered the rate or left it unchanged caused an increase in the actual amount raised by taxation.

SOME people can buy a good-sized Liberty Bond every few days and not feel it. Most of us cannot. Even to accumulate $50 at any one time looks like a tremen-

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

dous task to many people. Yet success in the War will be jeopardized unless everyone saves as much money as possible. For the person of small means, the new War Savings Certificates and Thrift Stamps furnish an opportunity to help win the War and at the same time to make a good 4% investment. The plan is similar to the one that has been so successful in Great Britain. War Savings Certificates cost $4.12 now, and increase in price each month as the interest accumulates. They are redeemable at $5 on January 1, 1923, and may also be redeemed before that time by sacrificing part of the interest. Thrift Stamps cost 25 cents each and may be exchanged at their face value for War Savings Certificates. They do not bear interest, but are issued simply as a convenience in order to help people to save small amounts, preparatory to purchasing War Savings Certificates.

ONE way to treat Priority Order No. 2 regarding the use of open-top cars for road materials is to declare that highway construction is crippled, and that the order must be rescinded or the country be ruined. Another way is to reason that the Priority Board knew its business and would not have issued the order if it had not been necessary, and then to consider methods of hauling road materials other than by the use of open-top cars. Development of local deposits, employment of motor trucks, and use of water transportation are all possible ways of solving the problem. Some large consumers of road materials have constructed make-shift gondola-cars by nailing boards around ordinary flat-cars. Furthermore producers of sand, gravel, and crushed rock can equip their plants so that box-cars can be loaded as conveniently as open-top cars. Possibly this expense would not be justified for the relatively short period that the embargo is likely to continue, but it should be remembered that cars are likely to be scarce for several years to come, and the plant that is equipped to use box-cars as well as open-top cars will have the advantage.

FEDERAL control of railroads has come. No more striking instance of the distance we have traveled on the road to centralization can be found than the fact that this important step has been taken by executive order without discussion in Congress. The transportation situation, especially on the Eastern roads, has been going from bad to worse, and the most obvious method of ameliorating conditions was prohibited by the laws against 'pooling'. It was easier for the Government to take over the railroads than to have the laws repealed. Furthermore the railroads need to make heavy investments in equipment and betterments if they are to be equal to the demands upon them. Government loans have made private financing practically impossible, so that some form of Government guarantee is required if the railroads are to get the capital they need. Under these conditions Federal control was the logical step. Details of the plan have not been made public at the time of going to press. Many of them have probably not even been formulated, but will be determined from time to time. If the present management of the railroads is allowed to continue, duplication and other wasted effort being eliminated, Federal control ought to be fairly successful. After the War we can decide what we want to do next. Two things, however, are reasonably certain; first, we will not go back to the system of artificially encouraged competition of the days before the War, and second, Federal incorporation and regulation must supersede regulation by State commissions, or else actual Federal ownership will be adopted.

Highways and the War

In another column appears a letter by Mr. L. W. Page, director of the United States Office of Public Roads and Rural Engineering, addressed to the heads of State Highway Departments and others in charge of highway construction throughout the country. Mr. Page asks especially for greater co-ordination between the various officials in charge of highway expenditures, so that the largest possible service may be obtained from the amount of money available.

The high cost of living has affected highway construction just as it has everything else. Wages have increased and the efficiency of labor has probably decreased. Contract prices on labor contracts are a better indication of actual labor cost than wage-scales and these show an increase of at least 50% over those named on similar work two or three years ago. Further increases are probable. Materials also are more expensive, although the increase in most cases has not been so great as the increase in the cost of labor. Roads built during the coming season will probably cost from 30 to 50% more than similar roads built three years ago. Added to this is the uncertainty regarding deliveries of materials. The embargo on open-top cars for road materials will probably be lifted in the spring when warmer weather reduces the extreme necessity for coal, but the most confirmed optimist has no expectation that our transportation systems will be able to work smoothly throughout the coming year.

Yet this very transportation question furnishes in itself the strongest argument for the continuation of a rational highway-building programme. If the public had realized five years ago the importance of highway construction and the possibilities of motor-truck transportation as fully as it does now, so many improved highways would have been built that there would be little or no traffic congestion at the present time. It is now too late to consider what roads ought to be built. The question is what highway work will give the greatest immediate return in improved transportation conditions. In making this determination the State Highway Departments will need assistance from persons in each locality who are acquainted with motor-truck traffic. Although motor trucks are being used for long hauls, their best field comprises relatively short hauls, say, up to 100 miles. Obviously an assured load in both directions also helps.

Generated on 2024-09-30 01:37 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

REVIEW OF THE MONTH

THE Federal Aid Road Act provided for the expenditure of Federal funds on the improvement, in cooperation with the State and local authorities, of 'post-roads.' A 'post-road' is defined as any road over which mail is carried outside of cities and towns with a population exceeding 2500. To the provision relating to cities and towns there is no objection, since municipal improvements are generally assumed to be strictly municipal affairs. The provision relating to the carrying of mail is another matter. Probably it was inserted to meet the objections of the more conservative Congressmen who hesitated to vote for any general appropriation of Federal funds for highway construction. Also, at the time the bill was passed, the opinion was general that the carrying of mail was the principal basis for Federal interest in local highways. We do not believe that this is the case now. Expeditious transportation of freight is the important problem. Of two roads, one of which sees the rural mail-carrier once a day, while the other carries a large motor-truck traffic between two important factories, which is the most worthy of Federal funds? This provision of the law should be amended so as to permit use of Federal funds on any important rural highway. The law as it stands gives wide discretionary power to the Secretary of Agriculture and his representatives and there is no reason that these powers should not be increased to the extent outlined.

RELIEF for at least some of the Californian oil-men operated on unpatented withdrawn land appears to be in sight. The general leasing bill is scheduled for consideration in the Senate on January 7. Opposition by the Navy Department has been withdrawn since the operators in the naval reserves were excepted from the benefits of the bill, and it will probably pass. Operators outside the reserves that are denied patent will be permitted to lease the lands they now occupy, and further exploration of withdrawn lands is made possible. As far as exploration is concerned, the measure will have little effect in California at least, since the remaining unexplored unpatented withdrawn land does not offer much inducement to the 'wild-catter'. On the other hand, the unpatented withdrawn area that has already been partly developed is large and valuable. If the present litigation can be cleared away and the machinery for leasing set to work, it is probable that some effect on the output of the Midway-Sunset field would be noticeable within six months, and that this increase would be considerable within a year. Production in the other fields in the State would be affected only slightly, if at all. Perhaps this will be soon enough to prevent the impending serious shortage of petroleum and petroleum products. It should be remembered, however, that the Buena Vista Hills field, which Captain Barneson showed in an article in our December issue, was the best place to drill for a rapid increase in production, is in Naval Reserve No. 2, and is, therefore, unaffected by the leasing bill.

WHAT the Navy Department intends to do with the land included in the naval reserves, a question that has puzzled Californian oil-men during the past few years, seems to be answered, in part at least, by the bill introduced by Senator Swanson. Apparently the Navy Department intends to condemn private claims in the reserves and operate the same. The total investment on land in Naval Reserve No. 2, not including that on the land patented to the Southern Pacific Company and operated by its fuel-oil department, is estimated at $5,465,000. In addition, something must be allowed for the value of the land where the patent cannot be attacked. While a large amount of money was spent in Naval Reserve No. 1, which includes the Elk Hills district, only one concern, the Associated Oil Company, obtained oil in commercial quantities, and no oil has been shipped from land in this reserve. Reserve No. 3 is in Wyoming, and is undeveloped. In addition, there are large reserves of unpatented and undeveloped oil-shale land in Colorado and Utah.

JUST what advantage the Navy Department expects to gain by going into the oil-producing business is hard to see. This will probably include the refining business as well, since the oil from reserves No. 1 and 2 is too light to be burned under boilers with safety, but must first have the more volatile constituents removed. This extension of activities may even include marketing, since it is hardly likely that the Navy can use all the by-products of its petroleum. No one doubts that the Government has a right to fix the price at which it will purchase petroleum products in time of war, or, for that matter, in time of peace. Is it possible that the Navy Department officials are dreaming of being able to produce oil more cheaply than the men who have spent their lives in the business? If not, why not continue to buy the oil needed, at a fair price, from the producers now in the field?

OIL production in California during 1917 amounted to approximately 98,000,000 barrels, considerably more than the production in either 1915 or 1916, and only a little less than the production for 1914, the record year. In 1914, however, production exceeded consumption by several million barrels, while in 1917 consumption had increased to such an extent that nearly 12,000,-

Generated on 2024-09-30 01:45 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

000 barrels was withdrawn from storage during the year. The present stock on hand is about 32,000,000 barrels. Allowing for the oil in storage that is below the outlets of tanks and sumps, and for the necessary storage along pipe-lines and at terminals, if consumption continues to exceed production at the present rate, the potential shortage will become an actual one early in 1919.

THE 'open shop' was sustained by the United States Supreme Court in a recent decision involving certain companies and labor unions in West Virginia. The decision is too long to be repeated in these columns, but the most important principles stated are as follows: Employers may legally operate their plants as 'open shops.' Workmen have a right to form unions, but such a right is not absolute, and must be exercised with reasonable regard for the conflicting rights of others. It is illegal to attempt to induce men employed in an 'open-shop' plant to coerce the employer and remaining employees. Proprietors of 'open shops' may legally prevent conspiracies to bring their non-union employees into labor organizations. The decision was rendered by a divided Court, six of the Justices voting in the affirmative and three in the negative, but no formal dissenting opinion was rendered.

CONTINGENT fees for engineering work are a much-discussed question. There is some force to the arguments of those who would permit an engineer to follow the example of the lawyers and, under certain conditions, accept such fees. Nevertheless, few will have any sympathy for an engineer who recently arranged to receive a particularly objectionable kind of contingent fee from a Californian city. This city had requested the State Railroad Commission to grant a reduction of lighting-rates, and had employed this engineer to prepare the technical data for presenting its side of the case, his compensation to be proportional to the amount of reduction that was obtained. After the engineer's testimony had been presented, the lighting company was so cruel as to offer in rebuttal, a copy of his contract with the city.

INCENDIARY fires in many parts of the country, as well as occasional bomb explosions call attention to a serious defect in the system of guarding most industrial plants. The watchmen are usually selected from superannuated employees, who have neither the mental alertness nor the physical strength to perform their duties adequately, particularly in these war times. A test was recently made at a large grain elevator where this type of watchman was employed. Inspectors entered the building, spent six hours there, made sketches of its most important features, and departed without being prevented or even seen by the venerable watchman. In ordinary times, this incident might be dismissed with the statement that if the owners were foolish enough to have such employees it was their own fault and the business of no one else. Nowadays, when most industrial plants are practically Government arsenals, such conduct may be an obstacle to success in the War. Another weak point about the watchmen usually employed is that there are so few of them. An investigation of a recent fire on the Baltimore waterfront disclosed that on one pier 900 feet long, on which hundreds of tons of inflammable merchandise was stored, there was only one watchman. Let us have more watchmen and better ones.

EXEMPTION of some engineering students from the provisions of the draft law has been arranged. The plan is similar to the one already in effect for medical students. About 6000 students in 117 colleges and technical schools are affected. To be exempt from draft, the student must hold a certificate from the president of his college that he has shown ability placing him among the highest third of the engineering graduates of his college during the past ten years. This regulation is more effective and easier to apply than a selection of exactly one-third of the present student-body. There has been danger that engineering students would fail to see that their first duty to their country may easily be the completion of their education. This new regulation definitely recognizes this fact.

THE interview with Captain Lucas appearing in another column contains much that will be of interest to the oil-man. Spindletop was the first oilfield of importance where rotary tools were used, and they soon displaced cable tools throughout the Gulf fields where soft caving material is the rule. When the first rotary outfits were brought to California eight or nine years ago to conquer the heavy gas-pressures in the Buena Vista Hills, the alternating soft material and hard 'shells' proved a serious obstacle to the use of the rotary system. It was years before heavier equipment and general improvement in methods made rotary tools almost as effective as cable tools in hard material. Besides being the scene of the first triumphs of the rotary system and being a remarkably productive field, Spindletop was a much over-drilled field, as the illustrations will show. Probably the same amount of oil could have been obtained with half the number of wells. Some of the casing may have been recovered from these unnecessary wells, but most of the other material and all the labor were wasted. Over-drilling has been a regrettable feature of the development of almost every oilfield. It is caused partly by the small acreage of many holdings, and partly by the fact that oil is migratory, and the man who drills closest to his boundary lines stands the best chance of getting some of the oil that originally was under his neighbor's land. Even when an agreement exists between owners as to the distance of wells from the property-line, the spacing of 'line-wells' is usually closer than it would be on a well-managed property under one ownership. If Congress finally passes a leasing bill at this session, regulations should be adopted that will insure proper spacing of wells and other conservation measures in all new development on leased land.

Generated on 2024-09-30 01:37 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Hydraulic-Mining Debris in the Sierra Nevada*

By G. K. GILBERT

Hydraulic mining in the Sierra Nevada commenced in the early 'fifties and continued in the face of opposition from the residents of the Sacramento and San Joaquin valleys until 1884. A series of injunctions was obtained in that year, which, although it did not eliminate hydraulic mining, restricted it to such an extent that little has been done since. Some of the hydraulic mines discharged tailing directly into streams, others upon gentle slopes of the land. After checking mining operations the deposits in the mountain streams were gradually washed down-stream. Where the rivers left the mountain gorges and entered the great valley there was an abrupt reduction in slope and velocity, resulting in the deposition of debris. These deposits, which may be called Piedmont deposits, extended toward the valley from the foot of the range, and usually reached the mid-valley trunk-stream. The material was coarse near the mountains and finer farther west. At the same time, deposits were being made in the main trunk-streams of the valley, namely, the Sacramento and Feather rivers.

The quantity of debris that a given stream transports is its load; the quantity it can transport may be called its capacity. Capacity varies with slope. The greater the slope the greater is the capacity. The change in capacity is always larger than the change in slope. Capacity varies with discharge. When the discharge is increased, the capacity per unit of discharge is also increased. An increase in discharge, however, does not increase capacity so much as the same relative increase in slope. Capacity varies with the character of the debris transported. The lower the specific gravity of the debris the greater the capacity, that is, the greater the weight of load which may be transported. The finer the debris the greater the capacity. Capacity is affected also by the shapes of the particles of debris, but, in general, only the size-factor is considered in relation to capacity. Size may be measured by diameter or by volume. In whichever way it is measured, an increase in fineness causes a somewhat greater increase in capacity. Capacity varies with the ratio of depth of water to width of stream. In the main, capacity increases with increase of this ratio, and this is true of the streams of Sacramento valley, but the opposite rule applies to small values of the ratio.

The fact that there is a limiting condition below which transportation does not take place is expressed by the word competent. For a stream of given discharge, flowing in a given channel and carrying debris of a given fineness, there is a competent slope; in a channel of given form and slope, and with debris of given fineness, there is a competent discharge; and for a given discharge in a given channel there is a competent fineness. The ratio in which capacity is modified by a change in slope, discharge, fineness of debris, or depth of current, is greater when the conditions are near competence than when they are far above competence. In other words, capacity is most sensitive, when near its lower limit, to changes in the conditions that control it.

The laws have been experimentally determined for the bed-load† treated by itself, and they are believed to be approximately true for the suspended load by itself. Nevertheless they cannot be affirmed for the total load, because of complications caused by the shifting of material from one load to the other. If a stream that is loaded to its full capacity reaches a point where the slope becomes smaller, it becomes overloaded. Part of the load is dropped, making a deposit. If a fully loaded stream reaches a point where the slope becomes steeper, its enlarged capacity causes it to take more load, and the taking of load erodes the bed. If the slope of the stream is not adjusted to the discharge and to the load it has to carry, then the stream continues to erode or deposit, or both, until an adjustment has been effected and the slope has become just adequate for the work. Any change of conditions which destroys the adjustment between slope, discharge, fineness, and load, makes re-adjustment necessary and starts a series of changes which may extend to all parts of the stream-profile. The mining debris disturbed the adjustment of the streams by adding to their load. Reclamation by levees disturbs it by increasing the flood-discharge in parts of the river-channels.

The law of adjusted profiles applies to streams with mobile beds, that is, alluvial streams. Streams with fixed beds are normally under-loaded, and their beds are modified only by abrasion. This process works toward an adjustment of slopes, but very slowly, and the factors involved are different from those of alluvial streams. The channel of an alluvial stream is composed of alternating ponds and shoals. The dimensions of these are related to the discharge. The variable discharge modifies these continually, each particular discharge tending to adjust them to its needs. Because of the greater power of streams during flood, the pattern of the bed is most nearly adjusted to flood-conditions. An alluvial stream that is not confined by rigid banks shapes for itself a course made of curves. The curves are not stationary, but undergo continual changes. The curve-pattern is large for a large stream and small for a small one. In a variable stream the pattern is adjusted to the needs of the flood-discharge. The general slope of

*Abstract, Professional Paper No. 105, U. S. Geological Survey.

†U. S. Geological Survey Professional Paper 86, 1914.

Generated on 2024-09-30 01:39 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

a stream-bed is determined chiefly by the load that travels at the time of the larger floods.

The laws thus far stated apply to the transportation of debris along a bed composed of similar debris. When a stream is made to sweep debris along the unyielding bed of a sluice or flume other laws apply. Capacity is greater for smooth beds than for rough. It is greater for coarse debris (up to the limit of competence) than for fine. In general it is greater for a flume than for a natural stream of the same size.

The amount of debris that has been removed since hydraulic mining practically ceased is indicated by the following: At the 'Narrows' of the Yuba river, several miles above Marysville, is a gauging-station of the U. S. Geological Survey. In 1903 a discharge of 500 second-feet corresponded to a gauge-reading of 13.6 ft. In 1913 the gauge-reading for the same discharge was 4 ft. At Sacramento, the records show low-water readings of zero on the city gauge in 1849 and 1856. In the early 'nineties, the low-water readings averaged about 10 ft., while in 1913 the low-water reading was 3 ft. In 1849 the tidal range at Sacramento was about 3 ft. This disappeared entirely about 1880, but re-appeared when the river again began to scour. In 1913 the tidal range was 1.5 ft. Estimates have been made of the amount of debris deposited in Suisun, San Pablo, and San Francisco bays, and in Carquinez strait, based on soundings by the U. S. Coast and Geodetic Survey. In Suisun bay, 64,000,000 cu. yd. was deposited between 1867 and 1886; in Carquinez strait, 40,000,000 cu. yd. between 1861 and 1890; in San Pablo bay, 366,000,000 cu. yd. between 1857 and 1897; and in San Francisco bay, 196,000,000 cu. yd. was deposited between 1856 and 1896. The total estimated amounts for the period 1849-1914 are as follows: Suisun bay, 200,000,000 cu. yd.; Carquinez strait, 50,000,000 cu. yd.; San Pablo bay, 570,000,000 cu. yd.; San Francisco bay, 326,000,000 cu. yd., making a total of 1,146,000,000 cu. yd. Approximate surveys were also made in 1909 to determine the amount of material removed in mining between 1849 and that year. These amounts are given below. The quantity removed since that time is comparatively small, probably between 5,000,000 and 10,000,000 cubic yards.

Hydraulic mining:	Cubic yards
Upper Feather river	100,000,000
Yuba river	684,000,000
Bear river	254,000,000
American river	257,000,000
Streams tributary to lateral basins of Sacramento river	30,000,000
Mokelumne to Tuolumne river, inclusive	230,000,000
Placer mining	60,000,000
Quartz mining (one-fourth in Sacramento basin)	50,000,000
Drift-mining (three-fourths in Sacramento basin)	30,000,000
Total mining debris:	
From hydraulic mining	1,555,000,000
From all mining tributary to Sacramento river	1,390,000,000
From all mining tributary to Suisun bay	1,665,000,000

The last-named amount is nearly eight times the material moved in constructing the Panama Canal.

In addition to mining, other causes have contributed to the erosion. Cultivation can be practised to as to reduce erosion instead of increasing it, but such methods are not usual in the Sierra Nevada. Roads and trails on steep grades and the side-ditches dug to protect roads, all assist erosion. So also does over-grazing. In addition there is considerable 'natural' erosion. The total 'non-mining' debris removed from the land surface of the various water-sheds tributary to Suisun bay between 1849 and 1914 is estimated at 700,000,000 cu. yd., of which 420,000,000 is from the watershed of the Sacramento river. If the mining debris is added, allowance being made for what has been removed since 1909, the total for the watersheds tributary to Suisun bay is 2,375,000,000 cu. yd., of which 1,820,000,000 cu. yd. is credited to the Sacramento river watershed.

Surveys indicate that at the present time this amount is distributed approximately as follows:

	Cubic yards
Deposited within the mountains	265,000,000
Piedmont deposits	520,000,000
Deposits in the channels of valley rivers	100,000,000
Deposits on inundated lands, including tidal marshes	294,000,000
Deposits in the bays	1,146,000,000
Deposits in the ocean	50,000,000
Total	2,375,000,000

This estimate of the mining debris does not include the material that is being and will continue to be washed by natural agencies from the slopes of abandoned hydraulic-mine workings.

Future movement and re-adjustment of the deposits of debris will be affected by restraining-works on rivers such as have already been built on the Yuba river at Daguerre point, but more especially by the work for flood-control now being done on the valley streams. In a few years a system of by-passes and levees will be completed, cutting off the basins that used to receive a large proportion of the debris carried by the rivers. These flood-control works will hasten the scouring of the main river-channels that is now in progress, and the debris now in the river-channels will be deposited in the bays. Of the 265,000,000 cu. yd. of mountain deposits of debris, 100,000,000 cu. yd. will probably remain in the mountains. Of the 520,000,000 cu. yd. of Piedmont deposits, 335,000,000 cu. yd. will probably be permanent. This leaves 350,000,000 cu. yd. to be carried to the bays. Assuming 50 years as the time when the amount of mining debris moved will have become negligible, and that 8,000,000 cu. yd. per year is the annual loss from erosion from natural causes, then the non-mining debris to be carried by the rivers in that time will be 400,000,000 cu. yd. Adding the amount now in the rivers, and the 350,000,000 cu. yd. of mountain and Piedmont deposits, gives 850,000,000 cu. yd. Two-thirds of the mountain and Piedmont deposits is coarser than silt, and the river deposits are almost entirely sand. Seven-eighths of the soil-waste is silt. However, in being carried to the bays, nearly all the material will be so comminuted before it

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

comes to rest that it will be exceedingly fine. Of the total amount, it is estimated that 50,000,000 cu. yd. will be deposited on the inundated lands before the reclamation projects now under way are completed, 40,000,000 cu. yd. will be carried to the ocean, and the remaining 760,000,000 cu. yd. will be deposited on the various shoals in the bays. In other words, the amount of debris now deposited on the shoals will be increased about 67%. A continuous channel exists from the mouths of the Sacramento and San Joaquin rivers to the Golden Gate bar. This channel is maintained by tidal currents. The tides are such that the stronger ebb-currents have a higher velocity than the stronger flood-currents. The ebb-currents, moreover, are reinforced by the discharge from the rivers. Consequently, sand and other coarse debris delivered to Suisun bay by the rivers, and dragged forward and backward by the currents, has a net movement toward the bar. While thus in transit it suffers attrition, and the greater part is ground so fine as to leave the channel-bed and to pass into suspension. At Pinole shoal, in San Pablo bay, midway between the river mouths and the bar, the coarsest material in the bed of the channel is fine sand, the grains being about as large as those of the sand which constitutes the crest of the bar. The course of the river-sand has not been traced beyond this point, but little of it can survive the buffetings of the remaining journey and find lodgment on the bar. The sand on the bar is stirred by storm-waves, which agitate the water to considerable depths, and it also is worn to silt.

The depth of water on the bar depends not only on the rate at which sand is supplied to it but also on the strength of tidal currents. The strength of currents depends in turn on the volume of the tidal prism. The effective tidal prism is the space between the position of the water-surface in the bays when the outward flow begins at the Golden Gate and the position of the water-surface when the outward flow ends. The volume of the prism has been reduced and is being reduced in three ways: by the filling of shoals and construction of piers, by the reclamation of tidal marshes, and by the deposition on shoals in the bays of debris brought by rivers and creeks. The encroachment caused by mining debris and general soil waste has reduced the tidal prism 2 or 3%, and the encroachment from marsh-reclamation about 1.5%. Theoretically the reduction of the tidal prism should produce two changes in the bar: a migration of the crest toward the land, and an upward growth, reducing the depth of water on the crest. A comparison of charts made from surveys in 1855, 1873, and 1900 shows that in each interval between surveys the crest migrated toward the land, the entire change of position being 1000 ft. The same charts indicate a loss in depth of 6 in. between 1855 and 1873, and a gain of 1 ft. between 1873 and 1900, giving a net gain of 6 in. between 1855 and 1900, but the accuracy of these indications is questioned. The theoretic change in depth corresponding to a migration of 1000 ft. would be less than 6 in., and would be a loss instead of a gain.

A reduction of the supply of sand is theoretically sufficient to increase the depth of water on the bar, and at the same time to cause the crest to move toward the shore, but there is no independent evidence of deficient sand-supply during the period to which the survey-data pertain. The observed gain in depth may have been actual, the result of an unknown change in conditions determining sand-supply, or may have been apparent only, the result of some undiscovered defect in methods of survey.

There is no reason to believe that mining debris deposited on the bar has affected or might affect the depth of water on the bar to any appreciable extent. There is good reason to believe that mining debris and the soil-waste promoted by agriculture and other industries have reduced and will reduce the depth of water by reducing the strength of the tidal currents, their effects in this direction being combined with the similar effects of reclaiming tidal marshes on the borders of the bays. Encroachments on the tidal prism of Suisun bay have less influence on the currents in the Golden Gate than similar encroachments in the lower bays. The reclamation of marsh-lands adjoining Suisun bay and Napa river has about half as much influence on the Golden Gate currents as the reclamation of marsh lands adjoining the southern part of San Francisco bay. The currents are affected only slightly by the reclamation of marsh-lands of the river-deltas; reclamation near the river mouths tends to weaken the currents, and reclamation in the remoter parts of the deltas to strengthen them.

LIFE OF TREATED RAILROAD TIES

Data collected by J. H. Waterman, superintendent of timber preservation for the Chicago, Burlington & Quincy Railroad were presented at the American Wood Preservers' Convention. Out of 550 red oak ties treated with zinc chloride and placed in South Dakota in 1900, 479 or 87% gave 15 years' service, and there is reason to believe that at least 50% will give 20 years' service. On a two-mile section in Nebraska and Colorado, 94% were in good condition after 14 years' service. Out of 24,000 ties laid in Illinois, 75% were in good condition after 14 years' service. Ties treated with creosote or with a mixture of creosote and zinc chloride showed less mechanical wear under the rails than ties treated with zinc alone, on account of the action of the oil on the surface in lubricating the tie and rail. This results in less rail-cutting and surface-wear.

Gas is obtained from peat mixed with coal at the principal gas-works at Akkrum, in the province of Friesland. It is stated that if peat alone were used the retorts would become too hot, because of the steam resulting from the moisture in the peat. Accordingly the retorts are filled with two parts in weight of coal to one part of peat. The gas is declared to be of excellent quality. The peat is entirely consumed in the process, and therefore yields no by-products.—'Mechanical World.'

Generated on 2024-09-30 01:36 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

City and County Consolidation for Los Angeles

The question of a consolidated city and county government for at least a part of Los Angeles county has been under discussion for some time, but the first thorough investigation of the problem has just been completed by the Taxpayers' Association of California. The results of this investigation have been published in a report of about 200 pages, upon which this article is based.

The total area of Los Angeles county is 3880 square miles, of which 1184 square miles is south of the south boundary of the Angeles National Forest. All of the incorporated municipalities are in this latter area. There are 38 of these, as follows: Alhambra, Arcadia, Avalon, Azusa, Beverly Hills, Burbank, Claremont, Compton, Covina, Eagle Rock, El Monte, El Segundo, Glendale, Glendora, Hermosa Beach, Huntington Park, Inglewood, Long Beach, Lordsburg (La Verne), Los Angeles, Manhattan Beach, Monrovia, Monterey Park, Pasadena, Pomona, Redondo Beach, San Fernando, San Gabriel, San Marino, Santa Monica, Sawtelle, Sierra Madre, South Pasadena, Tropico, Venice, Vernon, Watts, Whittier. Four of these municipalities, Long Beach, Pasadena, Pomona, and Santa Monica, have some form of commission government. Alhambra has a commission-manager government, and Los Angeles has the old style mayor and council system, with several other elective officials. The remaining thirty-two cities are incorporated under the general State laws as municipalities of the sixth class. In addition to these municipalities, there are 187 school districts, 34 lighting districts, 33 road-improvement districts, three water-works districts, and two protection districts, or nearly three hundred governmental divisions, each of which has the power to raise and spend money.

Two of the municipalities, El Segundo and Monterey Park were incorporated since the beginning of the year 1915-1916, the last for which full statistics are available, and they are not included in the financial statistics given below. The estimated population of Los Angeles in that year was 575,000, of all the municipalities, 779,000; of that part of the county south of the south boundary of the Angeles National Forest, 836,000; and of the entire county, 847,000. In the fiscal year 1915-1916, the total disbursements by all the governing bodies, exclusive of $2,121,062.09 for debt redemption, were $30,009,592.49, divided as follows:

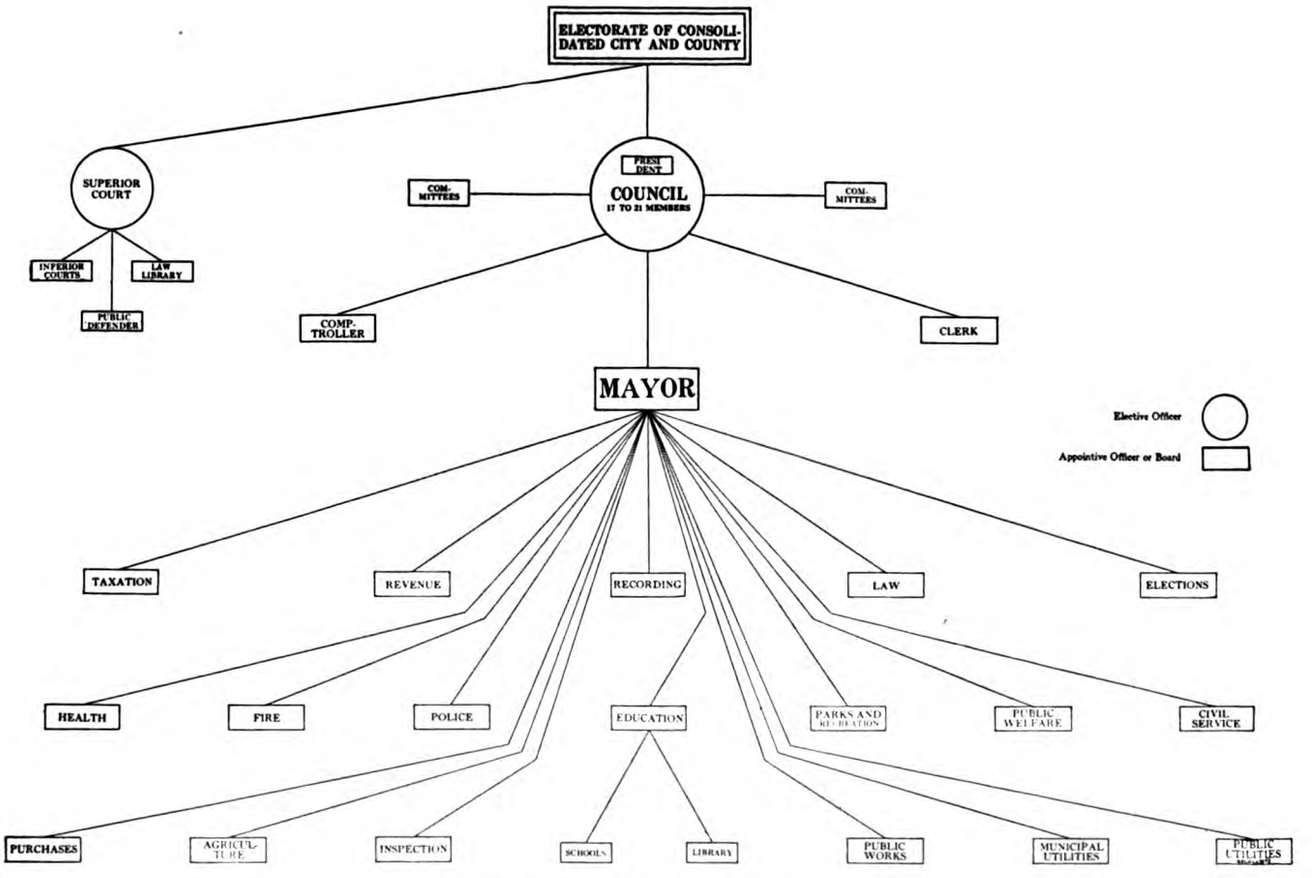
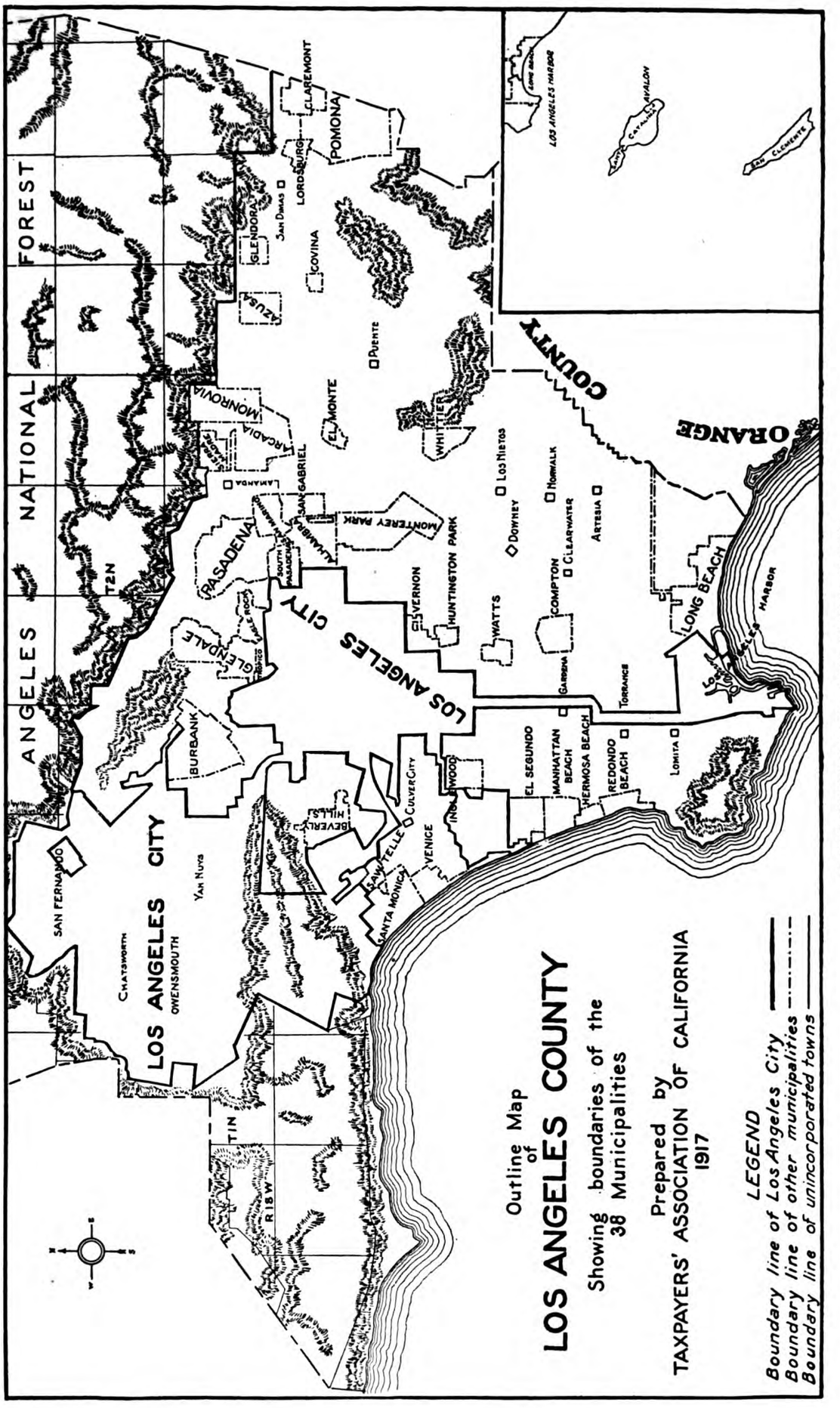


FIG. 1. ORGANIZATION PLAN FOR CONSOLIDATED GOVERNMENT

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



MAP OF SOUTHERN PART OF LOS ANGELES COUNTY

Generated on 2024-09-30 01:45 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

County of Los Angeles	$ 7,600,704.99
Municipalities	11,111,206.58
Schools (including kindergartens)	10,589,241.69
Lighting districts	140,624.08
Road-improvement districts	288,600.95
Water-works districts	267,484.49
Protection districts	11,729.71

Of this amount $23,343,159.36 was for salaries and other current expenses, and $6,666,433.13 for outlays, that is, improvements, some of which, at least, are permanent.

To reduce the duplication of expense and other waste resulting from such a system, or lack of system, of government, a combined city and county government is proposed. Whether this should include the entire county, or whether the thinly-settled part of the present county north of the south boundary of the Angeles National Forest should be allowed either to join another county or to form a county by itself, is relatively unimportant. Although the assessed valuation of the northern part of the county (about $15,000,000) is small compared with that of the southern part, it is nevertheless larger than that of any of 19 existing counties in the State. If the northern part of the county should be included in the proposed city and county plan, it should be set off as a separate borough, and should be taxed only for those expenditures that would be of direct benefit to it.

The general organization plan for the consolidated government is shown in Fig. 1. The legislative body would be an elective council composed of not more than 21 members, one from each of 21 wards or districts. This council would appoint the mayor or mayor-manager. This official would correspond to a city manager, but it would be better not to give him that name, as there has been a tendency in city-manager cities to regard the manager as a sort of glorified purchasing agent and foreman, instead of a real executive. In any case, the plan of a mayor and a manager, with the resulting divided authority, should not be followed. Besides the mayor, the council should appoint a clerk and comptroller. The administrative heads of the departments would be appointed by the mayor. Each department and office of the consolidated government would be divisionally organized so as to perform effectively the functions of the existing governments that would be transferred to it. Sixteen of the eighteen departments, namely, the departments of taxation, revenue, law, elections, health, fire, police, parks and recreation, public welfare, recording, purchases, agriculture, inspections, public works, municipal utilities, and public utilities, would have a single head. The civil service commission would be administered by three commissioners, and the department of education by a board of five members.

Definite plans have not been made for the reorganization of the Superior Court, Justice Courts, or Police Courts. Judges of the inferior courts should be appointed by the Superior Court, and it would probably be best for the Superior Court judges to be appointed by a single Chief Justice. Plans for the preservation of as much local self-government as is consistent with efficiency and economy have also to be devised later.

The following estimate of the minimum amount of money that could be saved by following the proposed plan has been prepared:

On salaries of members of existing legislative bodies	$61,000
On salaries of mayors and city managers, after reorganizing existing assistants	20,000
On other expenses of legislative bodies	150,000
By centring all accounting and auditing in the comptroller's office	25,000
On salaries of city clerks and their employees	38,000
On salaries of chiefs of existing law-departments	37,597
On salaries of deputies, assistants, and clerks in law-departments	no estimate
By abolishing the positions of assistant city attorney in charge of workmen's compensation matters and transferring the duties to the reorganized law department	1,800
On salaries of 34 treasurers and 4 tax and license collectors	31,319
By consolidating all assessing in the department of taxation	74,785
On salaries of the sheriff, chiefs of police, and city marshals	36,300
By transferring the duties of the sheriff's office to the police department	94,090
On salaries of secretaries of policemen's and firemen's pension funds	600
On salaries and compensation of members of boards of education	5,725
By eliminating the board of boiler inspectors and its secretary, and consolidating various inspections in the department of inspections	19,000
On salaries of chiefs of charity departments and of an accountant and bookkeeper	7,000
On salaries of thirty city engineers	25,000
On salary of the horticultural commissioner and of the secretary of the humane animal commission	2,928
By abolishing the position of accountant in the park department of Los Angeles city, the work to be done in the comptroller's office	1,200
On salaries of civil-service commissioners	1,800
On salaries in the coroner's office	6,000
On salary of public administrator, the duties to be performed by the commissioner of the department of law	3,000
By proper organization of purchases	1,000,000
By consolidating elections (minimum per annum)	26,357
On highway, street, and bridge expenditures	420,000
On operating and maintenance expenses, other than salaries	600,000
By the exercise of financial vision in connection with financial planning, a large amount but	no estimate
Total estimated annual savings, minimum	$2,688,519

The difficulties in the way of the adoption of such a plan are admitted to be great. Even if certain constitutional amendments should be ratified at the next State election, the procedure of consolidation would be long and complicated and would require several elections. Furthermore, local pride and the fear of interference with local self-government would be a hindrance to the adoption of a plan for consolidation. Some consolidation of governmental functions has, however, already taken place, notably the abolition of city assessors and

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

tax-collectors in about half the municipalities, this work being done by the county. The fact that the city limits of Los Angeles are contiguous to many of the smaller cities will also help toward consolidation. Probably an increase of efficiency and economy in the municipal government of Los Angeles itself would help more than any other one thing in convincing the residents of the outside cities of the advantages of consolidation.

HIGHWAY CONSTRUCTION IN WAR TIME

The following letter has been sent by L. W. Page, director of the U. S. Office of Public Roads and Rural Engineering, to heads of State Highway Departments and others in charge of highway work:

"Road construction throughout the United States has been seriously hampered as you know by reason of excessive costs, scarcity of labor, and inadequate transportation facilities. This situation would be serious even in normal times, but in this crisis when the public roads must in addition to their normal traffic be depended upon to relieve the tremendous strain to which the railways are subjected, it becomes a matter of vital importance that some means be found at least to deal with next season's work so as to assure better results than are possible under our present system.

"During the past few weeks I have discussed the subject with men who are identified with road work in various capacities. As an outcome of these discussions I am taking the liberty of suggesting for your consideration a policy for next year's road work which seeks to remedy some of the weaknesses of the present system. Briefly this policy proposes: (1) The selective consideration of next year's construction jobs in the States and the preparation of a programme of road work throughout the nation, in which programme each construction job would be listed in the order of its economic importance to the particular territory in which it is situated and to the nation as a whole. This arrangement would permit of the elimination of such work as may be omitted with least injury to our economic welfare; (2) a co-ordination of this selective process with the railway and water-transportation facilities with a view to insuring an adequate number of cars and vessels of suitable types, with proper distribution to transport materials for the construction of the approved jobs; (3) a co-ordination with the material-industries with a view to insuring supplies of materials in adequate amount, distribution, and deliveries to permit the construction programme to be carried out; (4) the adoption by each State of such measures with reference to construction contracts as would best meet the needs and requirements of the State.

"May I not ask that you advise me as to your views on the subject and that you favor me with any suggestion either as to policy or working-plan, and also as to what extent your department may be able to co-operate in a movement of this character."

RAISING THE HUNTINGTON LAKE DAMS

By H. H. COX*

The work of raising the dams of the Southern California Edison Co. at Huntington lake, California, has recently been completed. The original dams, three in number, and containing 120,000 cu. yd. of concrete, were finished to elevation 6915 in the spring of 1913, in time to store the run-off of that year. Work was started in September 1916 to raise the dams to elevation 6952.5. The work done that fall included building camps, sawmill, compressor-plant, machine-shop, and railroad tracks. The only concrete work done at this time was to replace the 6-ft. wooden flash-boards with concrete in order to maintain full storage capacity. Shipment of cement was started about the middle of November 1916 and the warehouses filled before the snow blocked the shipment, 30,000 bbl. being hauled by that time. Shipment was resumed in May 1917. In all 130,000 bbl. was used. Supplies were hauled by railroad to Cascada, and thence by a cable tramway to the lake, a rise of about 2000 ft. in 7000.

Construction was resumed on April 20, 1917, while the snow was still on the ground. Pouring concrete was started on June 5 and practically completed on October 5, the monthly totals being as follows:

	Cu. yd.
June	15,000
July	25,000
August	40,000
September	40,000
October (first five days)	7,000
After October 5	3,000
Total	130,000

The maximum amount poured in 20 hours was 1700 cu. yd. and the average was over 1000 yards per day for the four months. Gravel for the work was obtained within a mile of the dams. A crushing and a gravel-washing plant with a capacity of 1200 cu. yd. per day was constructed on the ground. Lumber for forms, trestles, and buildings was cut from the area to be flooded and was sawed in the mill on the work. Over 4,000,000 ft. B.M. was handled by this mill.

The original dams were of concrete to elevation 6915 with 6-ft. flash-boards above the concrete. The storage-capacity at elevation 6921 was 52,000 acre-feet. At the present crest-elevation of 6952.5, the storage-capacity is 90,000 acre-feet. The present height was determined after a study of water-records of the past eight years. The potential energy that can be developed from this amount of storage is 300,000,000 kilowatt-hours, permitting a saving of more than 1,200,000 bbl. of fuel-oil.

At dam No. 1 there is an automatic siphon-spillway of seven units, each with a capacity of 800 second-feet. There is also a 900-ft. overflow-spillway with a capacity of 10,000 second-feet. There are three 42-in. sluice-gates and one 72-in. gate in the dam.

*R. F. D. No. 1, Box 210, Los Angeles.

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Clear Lake Railroad Project

With the exception of Alpine county, Lake county is the only county in California without a mile of railroad within its boundaries. The area is about 1400 square miles and the population in 1910 was 5526. The resident population has probably increased considerably since then, and there is also a large transient population for a few months of each year at the various summer resorts. The northern part of the county is drained by the Eel river, but most of the rest of the county is on the watershed of Clear lake, which drains through Cache creek into the Sacramento river. Most of the land in the county is mountainous, and is used principally for stock-raising. There is, however, about 50,000 acres of valley land now under cultivation, and 70,000 acres of 'bench' land, which is suitable for orchards, and which is now being developed. Dairying and fruit-raising are the principal industries in the valleys.

Several projects for a railroad to serve the county have been proposed, the favorite route being from Hopland, on the Northwestern Pacific railroad to Lakeport, on Clear lake. The country, however, is mountainous, and the construction of a line according to ordinary railroad standards would have been expensive. On the other hand, the probable traffic would be comparatively small, and it seemed doubtful whether the revenue would be sufficient to pay interest on the cost of constructing a railroad, according to ordinary standards. Finally, however, a plan was arranged, based on suiting the character of construction to the probable traffic rather than building a so-called first-class line and hoping that the traffic would be sufficient to pay for it.

The proposed line will extend from Hopland over the summit of the Coast Range spur that forms the boundary between Mendocino and Lake counties, and down to Lakeport, 22.75 miles in all. The summit is 2000 ft. higher than Hopland, 980 ft. higher than Lakeport, and is about midway between them. Since the heaviest freight traffic will probably be west-bound, from Lakeport to Hopland, the maximum grade against west-bound traffic will be 3.3% and the maximum grade against east-bound traffic will be 5%. The maximum curvature will be 45°. Shay-geared locomotives will be used for the freight trains. The passenger, mail, and express business will be handled by gasoline-propelled cars of the 'one-man' type.

The heavy grades and sharp curvature will permit an alignment that will follow close to the grade-line contour, making the excavation and bridge-work comparatively small, about 33% less than the earlier plans. These plans provided for a summit-tunnel and for a number of embankments on steep side-hills, all of which are now eliminated. The total estimated excavation will be 340,000 cu. yd. There will be a truss-bridge, 244 ft. long across the Russian river, and 995 lin. ft. of pile trestles and 1915 lin. ft. of framed trestles on other parts of the line. The total estimated cost of building and equipping the line, using prices as of September 1917, is $485,000, exclusive of contractor's profit.

Freight from the district to be served by the proposed railroad is now carried by teams and motor trucks to various points on the Northwestern Pacific railroad. The prevailing rate is from $6 to $8 per ton, the average being $7. On account of the rough mountain roads, green fruit is usually damaged in transit, and this fact prevents the shipment of much green fruit. The total estimated inbound freight-traffic is 11,000 tons, and the outbound traffic 33,000 tons, or a total of 44,000 tons. As a conservative estimate it is assumed that at least 33,000 tons would be handled by the railroad during the first year after completion.

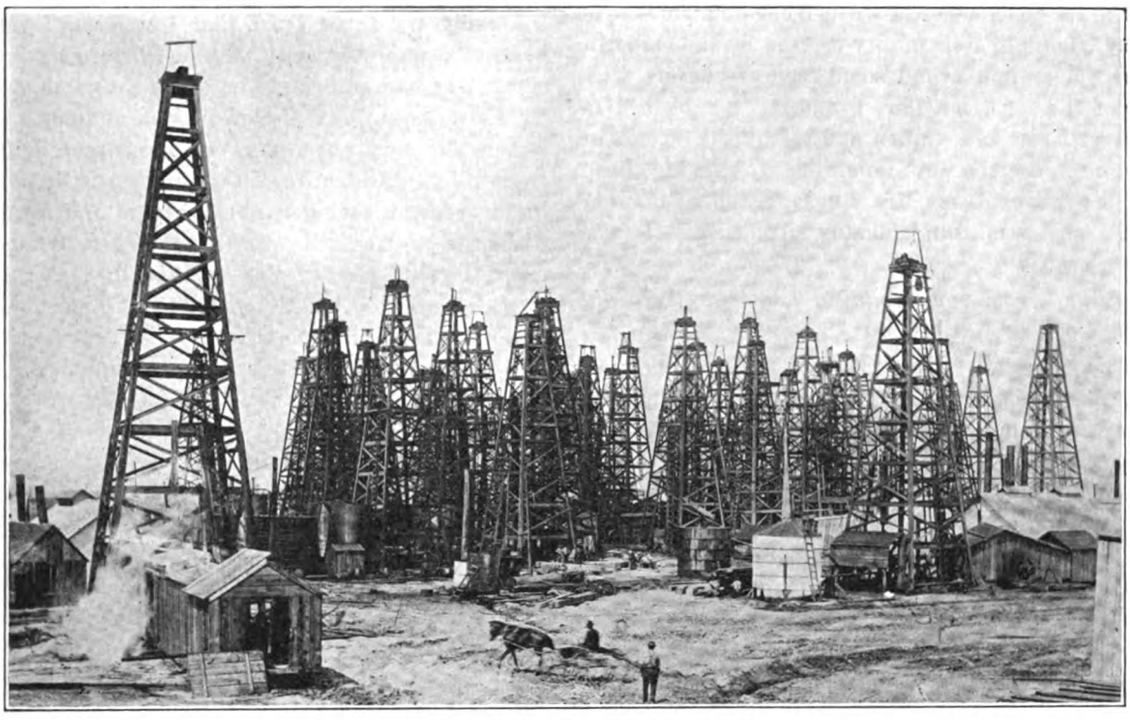
Since most of the freight in the district to be served is shipped either by stockholders of the railroad or by underwriters of the bonds, it is believed that the relatively high freight rate of $4 per ton can be maintained until the bonds of the road are retired. This will give a revenue of $132,000 from freight. Mail and express revenue should pay for the actual operating expense of the 'one-man' cars. A single train-crew, working some overtime during the three months when the crops are being moved, should be able to handle the freight-traffic. Except during this rush period, the train-crew should also be able to keep the equipment in repair. Two section crews should be able to do the maintenance-of-way work, with the assistance of some work-train service from the freight-crew during the winter months, when only three freight trains a week would need to be operated. General expense could also be kept at a comparatively low figure.

On this basis, operating expense is estimated at $66,000, depreciation at $13,000, and fixed charges at $37,000, or a total of $106,000 per year, showing that the road could probably pay its way with freight-revenue alone. If a reasonable allowance is made for increase of traffic after the road is opened, it seems probable that the bonds could be retired in eight or ten years.

Plans for financing the projected railroad have been approved by the State Railroad Commission. The Commission has also approved awarding the contract for construction to Guy L. Hardison, of San Francisco. It is expected that construction will be commenced in January and that the road will be completed not later than August 1918.

Cost of running automobiles on the Sun River project, Montana, ranged from 8c. to 11c. per mile, including interest and depreciation as well as operation and maintenance. These were five-passenger cars and they were used on all classes of work.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



SPINDLE TOP, TEXAS, IN 1902

Anthony F. Lucas, and the Beaumont Gusher

AN INTERVIEW. BY T. A. RICKARD

Capt. Lucas, you are of European origin?

Yes, Sir, I was born in Dalmatia, Austria, in 1855. My forefathers, however, were of pure Montenegrin blood.

What was your father's occupation?

He was a ship-builder and ship-owner on the island of Lesina.

So you had an interest early in engineering. What was your education?

My family moved to Trieste, where I was educated in the high-school and after that in the Polytechnic of Gratz; at the age of 20 I was graduated as an engineer.

After graduating, what did you do?

I entered the Austrian navy as a midshipman and was promoted to second lieutenant. At that time an unpleasant incident made me very much dissatisfied with the rigor of the service, perhaps because of my Slav origin, so that I was glad to accept an invitation to pay a visit to an uncle of mine in this country. For that purpose I obtained a six months' leave of absence and came to the United States. That was in 1879, when I was 24 years old.

I have an idea that your father's name was not Lucas?

My father's name was Luchich. The reason of the change was that when I came to America on a visit to my uncle, my father's brother, as I have stated, I found that my uncle had adopted the name of Lucas, owing to the difficulty that Americans had in spelling and pronouncing Luchich. So, for the time, expecting to remain only three or four months, I permitted myself to be addressed as Lucas. When I decided to reside in the United States I retained this modification of the name.

What happened to make you remain?

An engineering problem was offered to me during my stay in Michigan. At that time Michigan was a lumber country, and Saginaw, where I resided, was its centre. A gang-saw was needing some improvement in design, and when asked if I could do it I agreed with pleasure, completing the design satisfactorily to the mill-men. Later on I was asked to supervise the erection of this gang-saw. Then, just as the end of my leave was approaching, I was offered a flattering engagement, which, after some consideration, I accepted, asking, however, for another six months' leave. At the end of that time I had made up my mind to become an American citizen; I made proper application and completed the change of allegiance by obtaining my final papers four years later at Norfolk, Virginia, on the 9th of May, 1885.

Did you ever return to Dalmatia?

Yes, in 1887, nearly ten years after, on my wedding

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

journey. My wife and I went to Trieste, Fiume, and Pola, and to the place where I was born, Spalatro, which, by the way, is an old Roman city erected by the emperor Diocletian. Although I had some fear of contact with the rigor of the Austrian law, I was not troubled. On the contrary, I was entertained at Pola by the officers of the Navy and ascribe my immunity to having good friends, but perhaps it was Mrs. Lucas' charm of manner or because she was unmistakably American. I was abroad one year.

On your return from your wedding journey, where did you settle?

I made Washington my home, and entered the profession of mechanical and mining engineering. First I went to the San Juan region in Colorado and prospected for gold, with some little success, but after two years I returned and began to look around for a good opening in the mining industry, and became employed as mining engineer at a salt mine in Louisiana, in 1893, at Petit Anse, where I practised the engineering and mining of salt for three years.

What was the nature of the exploitation?

I found the salt deposit only 20 ft. below the drift-soil, and the shaft 180 ft. deep. Mine and mill were in very bad condition owing to the fact that water had found its way into the mine and caused a large cave. The mill was antiquated. It required constant care to check the caving and water in the mine, and the ravages of the salt on the mill machinery.

Was there any other technical feature worth mentioning?

Yes, the system of mining. I opened long drifts in virgin ground, adopting an overhead method of mining, feasible only under such conditions. A gallery was started with a 7-ft. under-cut, 50 to 60 ft. wide, and from 200 to 300 ft. long. After clearing away this broken salt in tram-cars the second under-cut was started, 18 to 20 ft. in height, and when this was cleared the final mining was begun with the aid of threepod ladders upon which light hand-drills were placed, drilling batteries of holes 10 ft. deep. Thus six or eight holes shot down hundreds of tons of salt. This method proceeded until, by the time the height reached 50 ft., no more ladders were needed, owing to the increased volume of the salt. The roof, of course, was arched toward the 40-ft. pillars left standing. Suspiciously loose slabs of salt were pried down or shot down to make the roof safe, and by the time the men had finished there remained a mass of from 3000 to 5000 tons of mined salt ready to be trammed and hoisted to the mill. By this method not a board or stick of timber was used or needed.

When the mining in this chamber was completed another under-cut was started laterally and we thus had always in reserve one or more chambers of mined salt, say, 60 ft. wide, 60 ft. high, and 200 or 300 ft. long, each containing from 3000 to 5000 tons, at a cost of less than 14 cents per ton of salt mined. The salt was of unusual purity, 98.5 to 99% sodium chloride, the remainder being gypsum.

What did you do next?

During the three years that I was employed there I became acquainted with Joseph Jefferson, the famous actor, who had an island known by his name, a few miles off Petit Anse. Mr. Jefferson was anxious to bore for water, and had actually given a contract, but the contractor found difficulties in complying with the terms of his agreement, owing to the boulders and sand through which he had to drill. At this time Mr. Jefferson asked me if I could see my way to help the contractor. Although employed by the salt people, I accepted eagerly, and helped by introducing a method of driving the casing and succeeded in assisting the contractor to pass through the gravel bed. About 100 ft. deeper we struck what appeared to be solid rock, but upon analysis, it proved to be an enormous bed of salt. Then Mr. Jefferson asked me if I would continue the exploration in an advisory capacity, which I did. I purchased a diamond-drill from the Sullivan Machinery Co., of Chicago, and drilled to the depth of 2100 ft., still in salt, a total thickness of 1750 ft. of salt, without encountering any foreign substance.

What did you do with this discovery?

During my operations at Jefferson island rumors were spread by uncharitable persons that I was fooling Mr. Jefferson. I was asked, if I claimed I had so much salt, why did I haul carloads of salt from Petit Anse to Jefferson island. It is true I hauled several carloads of waste salt, but only to use as brine with which to bore, so that it would not enlarge the bore excessively. You will understand that if I used fresh water I would have dissolved the walls of the bore. Owing to this malicious gossip, Mr. Jefferson asked me if I had found enough salt, as he wanted to stop. I replied that I had salt enough to salt the earth; I was proceeding nicely, and was anxious to find the floor of the salt, when he stopped me at 2100 ft., thus balking a possible study in geology, for I wanted to learn on which geological formation this salt was resting.

That must be an enormous mass of salt, do you know of any larger?

The salt mines at Wielitzka, in Austrian Poland, are worked at over 3000 ft. in depth, and the potash salt mines in the Stassfurt district of Germany are worked to over 1500 ft. in depth, but the salt deposits of our Coastal Plain now surpass both of those in quantity and extent.

Probably you had an idea of mining from that floor upward?

No, because I found on subsequent borings that the salt mass was in one locality only 81 ft. from the surface, and to mine at a depth below 2100 ft. would have been costly and unnecessary when one could mine at a reasonable depth, say, 500 ft., and leave between 200 to 400 ft. of solid salt for a roof. Mr. Jefferson, however, decided to leave this deposit to his grandchildren, and I heard only recently that it has been sold.

Generated on 2024-09-30 01:37 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

So, Captain, you had to make another start?

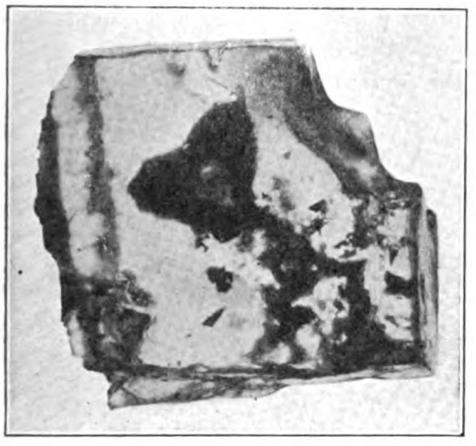
Yes; in the meantime I had examined a small island known as Belle Isle, on the Gulf coast, one of a series of five islands now well-known for their salt deposits, and contracted with the owner to explore Belle Isle for minerals on my own account. I undertook to explore the land by perforations. Four wells were drilled for salt, discovering thereby a deposit not only of salt, but of sulphur and oil as well.

How were these three minerals related in space?

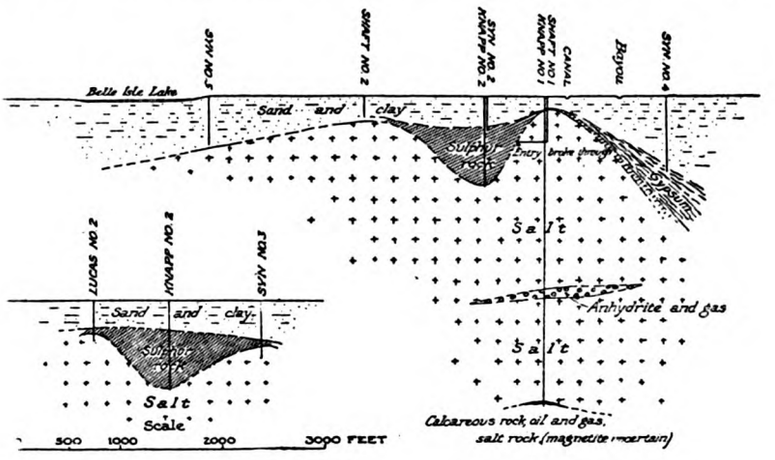
The first well was a miss; the second well penetrated a 66-ft. bed of sulphur, and below that I discovered the matrix of a salt dome. By further boring I encountered oil-sand at a depth of 115 ft., and deeper down, at about 800 ft., I discovered a strong flow of petroleum gas. Resting there, I completed my contract, and acquired title to one-half of the mineral resources of the island.

You then proceeded to exploit the oil?

I did not have the money. The island was purchased later by the American Salt Co. and I received a consideration of $30,000 in bonds and $5000 in cash. This led me to study the accumulation of oil around salt masses, and I formed additional plans for prospecting other localities. Thus I began my investigations into the occurrence of oil on the Coastal Plain. That was in 1897.



CRYSTAL OF SALT SHOWING INCLUSION OF OIL AND GAS

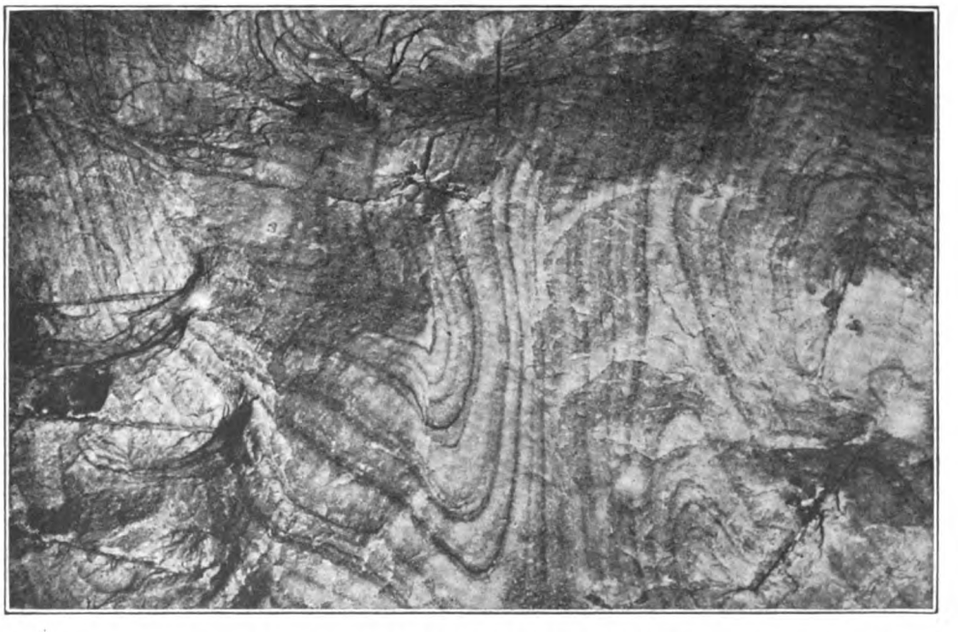


CROSS-SECTION OF RECENT WELLS, SHOWING THE POCKET OF SULPHUR, AT BELLE ISLE

I fully expected that the American Salt Co. would put me in charge of their operations, but they did not make me the offer and I did not make any request. They sent a New York salt man and began large operations, involving over two million dollars.

Which of the three minerals did they exploit?

Salt only. Unfortunately, the method of mining salt in Wyoming county, New York, was not adapted to the deposits of the Coastal Plain. They started sinking a large working shaft where it showed nearest to the surface, at 115 ft., without having previously sounded the



ROOF OF CHAMBER IN THE WEEKS SALT MINE

Generated on 2024-09-30 01:42 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

deposit by boring to ascertain its conformation and purity. Salt is much in demand from the meat-packers of the interior, but this particular salt was unmarketable because it was impregnated with oil and gas. In bailing out the salt-cuttings and dumping them on the floor, they would explode like pop-corn. This was caused by the sudden liberation of gas coming in contact with the air. In my exploration of the various salt deposits of the Coastal Plain this was my only experience of the kind.

What did the contractors do?

They sank to a depth of 250 ft. and started driving toward the interior of the deposit, searching for purer salt. When I heard what they were doing, I telegraphed at once asking if the drift was in the right direction, and if they had sounded with a diamond-drill in that direction. Unfortunately, the next news was that they had passed through the salt and had penetrated quicksand. The mire of the marshes drove them out and they barely had time to save the men, thus losing the first shaft. It proved afterward that the salt in this locality formed a depression, 500 ft. westward, although it was connected with the main dome. They started another shaft westward, but made a series of woeful blunders. The salt did not occur so shallow there and they had to go down 276 ft. before they reached it. On top of this salt they found a layer of about 30 ft. of bad quicksand through which they could not pass. They then employed an expert shaft-sinker, named Sooy-Smith, who employed a freezing process. Another unfortunate incident was that Sooy-Smith never put the brine-pipes in the salt; he stopped in this quicksand, so that when the mass was frozen, preparatory to mining, they were just as badly off and could not pass the quicksand. They spent a large sum of money, finally abandoning the effort. They then proceeded to explore for oil, and after a series of efforts gave that up. The island was sold at public auction and is now the property of the New Orleans Mining Corporation.

That did not stop your prospecting, I feel sure. What did you do?

I explored, meantime, Weeks island, also in Louisiana, and there discovered a magnificent bed of salt now being worked with commercial success. Meanwhile further investigation led me to proceed. I selected a point known as Anse la Butte, six miles north of Lafayette, in Louisiana. In this locality I again discovered oil and salt, but not under favorable conditions. (Since that time, however, it has produced and is still producing large quantities of oil.) So I abandoned the discovery and went to Beaumont, Texas, about 70 miles west of Lafayette. There I was attracted by an elevation, then known locally as Big Hill, although this hill amounted merely to a mound rising only 12 ft. above the level of the prairie.

What led you to prospect there?

This mound attracted my attention on account of the contour, which indicated possibilities for an incipient dome below, and because at the apex of it there were exudations of sulphuretted hydrogen gas. This gas suggested to me, in the light of my experience at Belle Isle, that it might prove a source of either sulphur or oil, or both. I decided to test it therefore and leased all the ground that I could secure.

How many acres?

The hillock only covered 300 acres, of which I secured 220 acres; but I leased altogether about 27,000 acres in the vicinity in order to have ample scope for exploration, although this proved unnecessary, as no oil was ever found beyond the contour of the dome.

What was your first result?

This elevation had already been explored by three companies and none succeeded in penetrating below 250 ft. in depth.

Why?

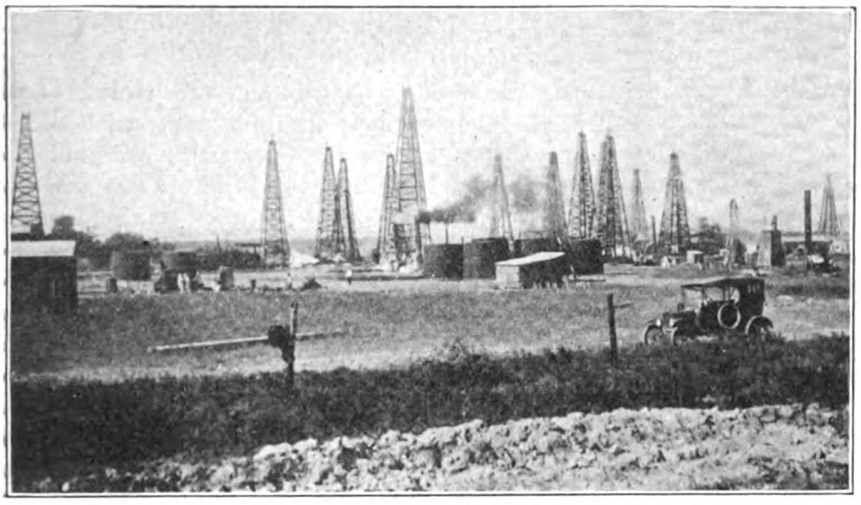
Because a bed of quicksand was struck at about 200 ft. Knowing that they used cable-drilling apparatus, I decided that that must have been the reason for their failure, so I set to work with rotary-drilling tools. The rotary drill at that time was almost unknown and was only used for artesian-water wells of shallow depth on ranches and rice plantations. I penetrated the quicksand and soon realized that I was correct in my surmise of the reason why my predecessors had failed. I managed to pass the quicksand and bored to a depth of 575 ft., encountering an oil-sand but losing the well by gas collapse. I thought best, however, before proceeding with heavier rotary-drilling machinery to seek geological and financial aid, so I went to a number of capitalists and laid before them my plans and expectations; but they turned me down. I recall one instance, when a friend took me to see former Congressman Sibley, of Pennsylvania, to lay before him my project. He read me a lecture and stated that he could not participate in such a wild scheme; that unless I had a production of so many thousand barrels per day to count upon, he was obliged to decline; to which I replied, that if I had such a production I probably would not have come to see him.

You did not abandon your quest?

No, I went to others, for instance to H. C. Folger, Jr., of the Standard Oil Co., in February 1899. I had a bottle of the oil with me and it happened to be a bitter cold night in New York. Having my ideas on practical issues, I put the bottle out of my window in order to give it a cold test. The oil was 17° B. gravity; it did not seem to congeal at all, although I understood that the temperature outdoors was two or three degrees below zero. Happy in this test, I went to see Mr. Folger, and laid the matter before him, asking him to join me. I told him that I did not want money personally, only assistance in further prospecting and proving the field; but Mr. Folger, while he received me graciously, declined. However, he promised to send Call Paine, of Titusville, the then Standard Oil expert, to examine my scheme. Paine arrived a month later, with J. S. Cullinan, who later became President of the Texas Company. I showed them

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

the location of my first shallow well and the heavy oil extracted therefrom. I also explained to them my 'nascent dome' theory. It ended, however, with Mr. Paine giving me a piece of well-meant advice, to wit, that there was no indication whatever to warrant the expectation

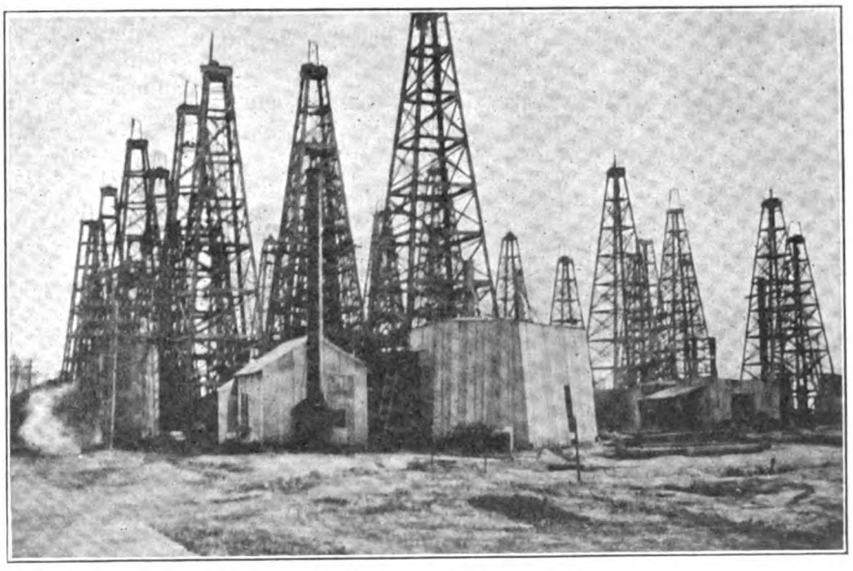


DAMON MOUND, TEXAS

of an oilfield on the prairies of south-eastern Texas, that he had been in Russia, Borneo, Sumatra, and Rumania, and in every oilfield of the United States, and that the indications I had shown him there had no analogy to any oilfield known to him, that I absolutely had no chance, as in fact there was not the slightest trace of even an oil-escape; in conclusion, he advised me to go back to my profession of mining engineering. *That was a squelcher; did it crush you?*

I retorted by showing him a demijohn of the heavy 17° B. oil, obtained at 575 ft. He characterized it as of no value and of no importance whatever, stating further that such heavy stuff could be found most anywhere. I am, however, convinced that Mr. Paine was sincere in his advice, which naturally shook my confidence.

Another incident happened during the fall of 1899 to shatter my faith in the venture. Charles W. Hayes, formerly Chief Geologist of the U. S. Geological Survey, accompanied by Edward W. Parker, formerly Chief Statistician of the Survey, dropped in on me to see what I was doing, and I explained to Mr. Hayes in detail my deductions of possible oil accumulations around great masses of salt, etc. He also discouraged me, saying that there were no precedents for expecting to find oil on the great unconsolidated sands and clays of the Coastal Plain, pointing to the great well drilled by the city of Galveston, Texas, over 3000 ft. in depth (a big undertaking at that time and one that cost the city nearly a million dollars), stating further that I had no seepages of oil, as leaders or indications, etc. I pointed to the great sulphur dome near Lake Charles, at that time in course of development by Herman Frasch, whereon a limited production of 1½ barrels of oil was obtained—a heavy oil it is true and a straw for me to grasp—but no encouragement could I get from Mr. Hayes, whom I of course knew as one of the best geologists in the country. Thereupon I began to seek co-operation and financial aid from some one better fortified than myself financially. This led me to enlist the aid of J. M. Guffey, of Pittsburgh, who took my proposition up, but to whom I was obliged to relinquish the larger part of my interest in the venture. In the first well that I drilled with Mr. Guffey's money, at a cost of less than $6000, at a depth of about 1100 ft., the oil came with a rush of over 100,000 bbl. per day. This was on the 10th day of January 1901. Next day I received a telegram from Mr. Paine extending to me his warmest congratulations on my success and saying that he was coming down to see the new wonder. He little knew, however, that he and Mr. Hayes were the indirect cause of my "selling my birthright for a mess of pottage."



SPINDLE TOP, TEXAS, EARLY IN 1902

Mr. Cullinan also appeared next day and became a large factor in the Spindle Top field, realizing millions thereby, and enabling him later to organize the Texas Company, a corporation now worth its hundred millions of dollars. Mr. Guffey, with Andrew Mellon, of Pittsburgh, organized the J. M. Guffey Petroleum Co., with a capital of $15,000. This capital was later largely increased, and later still the title of the company was changed to the Gulf Petroleum Company.

Generated on 2024-09-30 01:36 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

So Guffey became associated with you?

Yes, he was a noted petroleum operator in Pennsylvania. I entered into a contract with him that he should drill three wells, at least 1200 ft. deep, under my direction.

Did he undertake to supply the capital?

He undertook to stand the expense of three wells, and I was to superintend the operations. The first well, however, proved the Lucas gusher at a cost of less than $6000.

You proceeded to work?

I contracted with Al and Jim Hamill, of Corsicana, to drill three wells at $2 per foot, we to furnish the casings. I took charge of the drilling and chose a site where the now famous Spindle Top, or Lucas, gusher, was developed.

Kindly outline the events that led up to the escape of oil?

The first casing was 12 inches, reducing the diameter finally to 6 inches. When we reached the quicksand, at about 300 ft., we began to have trouble; our drill-pipes stuck. The 6-in. pipe was relieved by going over with an 8-in. pipe, which in turn became stuck, and I, knowing that the practicable limits had been reached, was in great distress to proceed with the work. I could not sleep that night, but toward morning the thought came to me that if a boiler having a 100-lb. pressure of water could be pumped full without any water coming out, there was a reason for it, and the reason was that it had a check-valve alongside. That proved an eye-opener to me. Much excited, I hastened to see my driller and explain what I wanted. Thereupon I designed a check-valve, made out of the boards of a pine box lying in my back yard, and with openings in the centre and a small rubber belt underneath I placed this check-valve between the coupling of the casings, and thus proceeded without any further trouble.

Did you patent your invention?

No, at the time I had it in mind to do so but was deluged with work and incipient possibilities. If I had done so I would have realized a large amount of money.

How did your drilling proceed by aid of the check-valve?

The drill-hole proceeded through various layers of quicksand to 800 ft., then struck lime and sulphur for about 250 ft., to a few feet less than 1100, and while we were lowering the casing, after having sharpened the bit, the casing (which was attached with a block and five strands of 2-in. cable) began to rise, increasing in momentum until the whole casing of about 1100 ft. was shot out to an unknown height, carrying the heavy block and the head blocks of the derrick with it into the air, followed by a gush of muddy water, our own drilling-water, then by rocks and fossils, and finally gas. It then settled down to a magnificent 6-in. stream of solid oil of 23° B., rising to a height of 200 ft. That was the celebrated gusher, which ran wild for 10 days, making a lake of nearly 30 acres, which was impounded by levees that I built to confine it.

Were you charged with damages?

I was served notice by the railroad company and by a marine insurance company at Port Arthur and Sabine Pass that ships were endangered, as a great deal of oil had found its way to these seaports, 16 miles below on the coast, and requesting me to remove the oil. The Southern Pacific railroad company also served notice on me to remove the oil because of the danger to the tracks, etc.

How did you control the flow of oil?

During the ten days that preceded the closing of the well, I had innumerable offers from irresponsible people to close it for me, because some newspaper had published a statement that I would give $10,000 to any one who would close the well. One of the offers was made to me by a woman in Illinois. She telegraphed that if I would put the $10,000 in a bank, subject to her order, she would use her occult power to discipline nature. However, I realized that it was up to me and my men to solve the problem. In 10 days we completed the construction of a steel-rail carriage to pass an 8-in. gate-valve over the 6-in. stream of oil. At 10 o'clock in the morning of the tenth day, with the aid of block and tackle, I started to drive and drag this valve, which was woven with the iron rails, to enter this powerful stream. At the first impact when this gate-valve, which was open, came in contact with the stream of oil, the derrick, badly shaken, but still holding, began to rock, and I remember picking up one of the fossils on the ground to throw at the horses so as to urge them to faster speed, until finally the valve passed the stream of oil, which was turned inside of it. Then we screwed the valve on the 8-in. casing, and that closed the gusher. This discovery of oil led to the development of a big oilfield, which became known as Spindle Top. It has produced over 50,000,000 bbl. of oil, and is still producing.

I hope, Captain, that you received a proper financial reward this time?

I did, but my chief reward was to have created a precedent in geology whereby the Gulf coast of the Coastal Plain has been and is now a beehive of production and industry. Owing to the fact that Mr. Guffey and the Mellon group had a lot of money and I had not, I accepted their offer and sold my interest to them for a satisfactory sum.

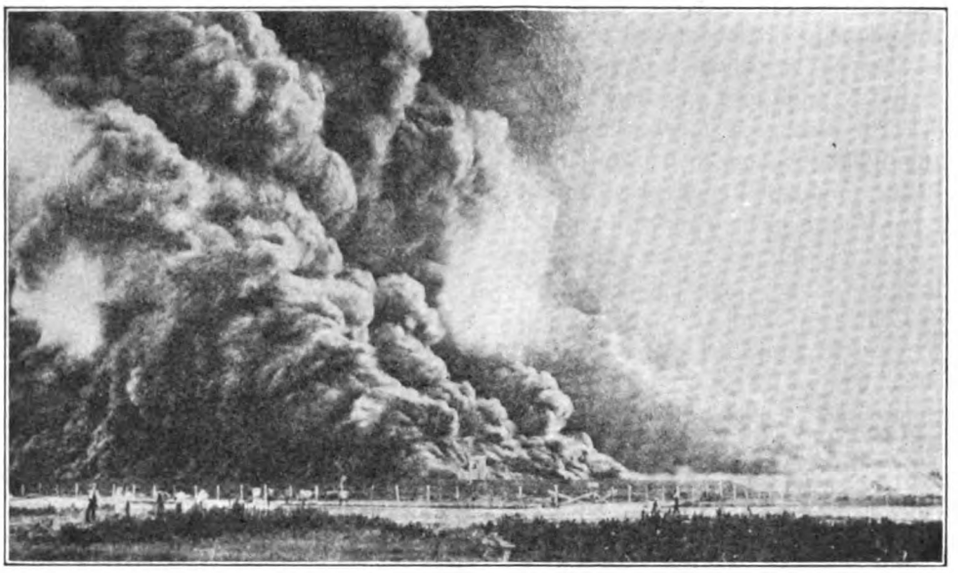
Did you stay there long?

I severed my connection with the Guffey Petroleum Co. about six months after the Beaumont discovery. In selling to them I retained the leases that I had acquired at High Island, near Galveston, an entirely different locality, 70 miles south-west of Spindle Top. I also secured land and drilled a well for the Guffey Petroleum Co. on another dome then known as Bryan Heights, on the Gulf, some 40 miles south-west of Galveston.

What success did you have?

In July, 1901, at 800 ft. deep, I struck a powerful force of sulphuretted hydrogen gas, which drove my men and everybody else off the location. Unfortunately, the company neglected that discovery and it became forfeited

Generated on 2024-09-30 01:39 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



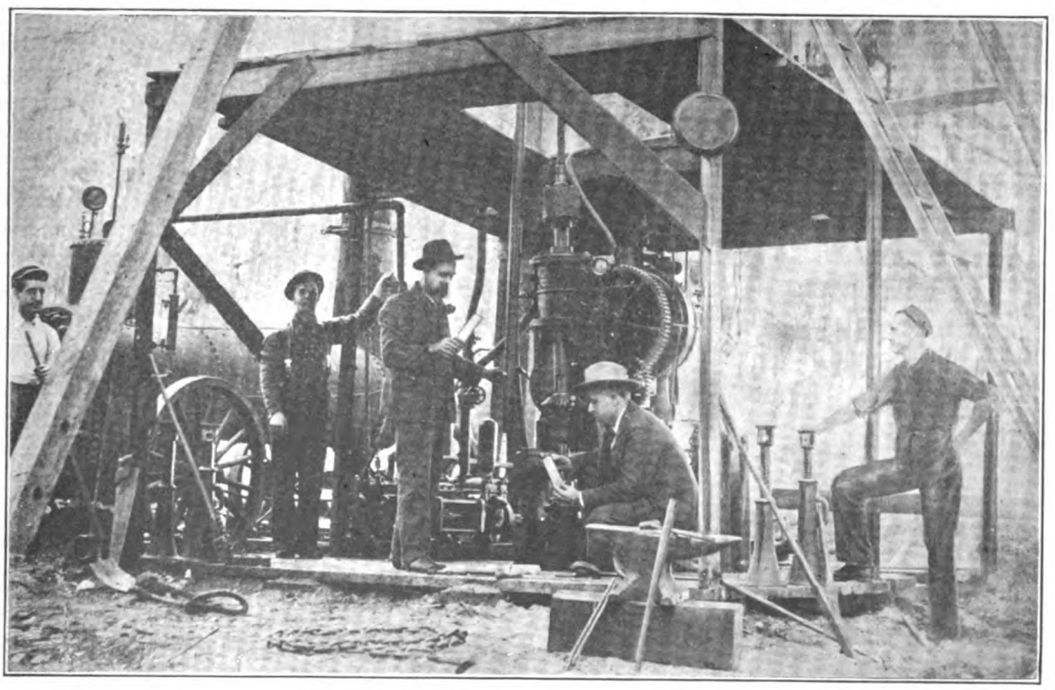
BURNING OF A MILLION BARRELS OF OIL AT SPINDLE TOP, TEXAS

in the next three years; subsequently it was taken up by speculators, who induced Eric L. Swenson, one of the directors of the National City Bank of New York, to proceed on the basis of positive knowledge of a sulphur bed existing there. Mr. Swenson organized the Freeport Sulphur Co. and is now exploiting it by aid of the method applied by Herman Frasch at a similar sulphur deposit, in Louisiana, by the process of melting the sulphur with hot water and forcing it to the surface by the pressure of hot air. This, together with the operations of the Union Sulphur Co., is one of the main sources of sulphur supply in the United States, and is proving most useful as an ingredient of explosives for warfare. Another well worth mentioning was located by me for the Guffey Petroleum Co., in 1901, on a tract of land known as the Damon Mound in Brazoria county, Texas, 30 to 40 miles from Houston.

What did you do there?

In order to obtain leases on this dome, I had to promise the owner, J. F. Herndon, that this well should be called by his name. The well, while it did not prove a failure, for the reason that it became clogged and ruined at 1600 ft., enabled us to ascertain the existence of a bed of sulphur and oil. This dome is now producing between 5000 and 10,000 bbl. per well per day.

So you severed your connection with the Guffey company?



CAPT. LUCAS DRILLING ON JEFFERSON ISLAND IN 1896. HE IS SHOWN SITTING, EXAMINING A CORE JUST REMOVED FROM THE DRILL.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Yes, I had no more interest in their affair. This promising field became abandoned until about two years ago when E. F. Sims, of New York, began to prospect the dome, which is over 100 ft. high and one of the largest on the Coastal Plain. The result was to bring in gushers that are now yielding 10,000 bbl. per well. On another part of the dome there was exploited a great sulphur deposit, and deeper down an enormous mass of rock-salt to unknown depth. I got nothing out of this, except that I had bought two tracts of land at the time I was drilling, and two additional tracts of land that were presented to me by the Cave heirs of Paducah, Kentucky. These two additional tracts of land of 10 acres were presented to me with the compliments of the heirs, but, not obtaining satisfactory results, I deeded them back. These tracts of land are now worth a considerable amount of money, as they are producing large quantities of oil, but I retain the two originally purchased tracts, covering 17 acres. The land is now very valuable.

How many years did you spend in this region?

About three years. After that I became connected with Sir Wheetman Pearson, now Lord Cowdray, who, as you know, has large oil interests in southern Mexico.

Please say something about your Mexican experience in oil?

In 1902 I went to Coatzacoalcos, now known as Puerto Mexico, where I located two fields, one known as the San Cristobal, and the other as Jaltipam, on the Tehuantepec railroad. The former is producing a beautiful light paraffine oil; the latter, a somewhat sluggish heavy oil; both, however, are attractive oilfields.

You were advisory engineer to Sir Wheetman?

Yes, and three years after my arrival in Mexico he made me a flattering offer to remain as managing engineer in Mexico, but, owing to other aims and interests, I declined, returning to Washington in 1905. Since then I have been practising the profession of consulting engineer. My work has taken me to various parts of the world, notably Algeria, North Africa, Russia, Rumania, Galicia, and Stassfurt, besides various oilfields in the United States.

Would you say something concerning the oil resources of the Tampico oilfield, which, I understand, today is so important a factor in supplying the Allies with fuel-oil?

In 1903, E. L. Doheny was operating in the neighborhood of Tampico, and his success induced Pearson to obtain large concessions there, but I had no part in it. I know that the production of the Tampico field is very large, and it contains large resources of petroleum, which is now supplied to ourselves and our allied fleet.

Have you been to any other Mexican oilfield?

Yes, through the instrumentality of Sir Wheetman, I went by way of Oaxaca in 1903 to the Pacific coast, where the son of President Diaz and other capitalists had been operating for oil, near Port Angel in the State of Vera Cruz. There were no safe ports there and they were obliged to beach barges of supplies towed from San Francisco, from which place they unloaded the machinery and pipes. I found them laboring under great difficulties, for the reason that they were drilling in pure syenite, which, as you know, is a crystalline rock in which engineers in general would not expect to find oil, although there were some oozes of neutral oil on the surface. This field has never produced oil. I discouraged the continuation of this work, but owing to the fact that they had already invested a large amount of money, they did not do it gracefully, and continued for another year and a half, until ultimately they had to give it up. Here I contracted dysentery, which kept me nearly a year confined to my home.

You have not been to any of the Californian oilfields?

No. The conditions there were not such as interested me, compared with the Coastal Plain in Louisiana and Texas.

By the way, Capt. Lucas, you have a son?

Yes, I have a son, born two years after my marriage. He is now a lieutenant with General Pershing's army in France.

REPORT ON INDUCTIVE INTERFERENCE BY CALIFORNIA STATE RAILROAD COMMISSION

An investigation of inductive interference was commenced in December 1912 under the auspices of the California State Railroad Commission, by a Joint Committee, composed of engineers representing the Commission and the railroads, power, telegraph, and telephone companies of the State. The Committee rendered a preliminary report in 1914, including a number of recommendations, which were embodied in General Order No. 39 of the Commission. The final report of the Committee was rendered in September 1917, and includes revised rules for the avoidance or mitigation of interference between power communication lines. An idea of the extent of the Committee's work may be gained from the fact that the total cost was $100,000. The detailed record of the investigations of the Committee is contained in a series of 71 technical reports, which are now on file at the offices of the Commission. To make these reports accessible to the public, it is proposed to publish 30 of the more important reports, together with the two reports of the Committee to the Commission. The book will have a complete index and will contain about 1000 pages, with over 400 drawings and 30 photographs. Publication is, however, contingent upon a sufficient number of subscriptions being obtained in advance to cover the actual cost of printing and binding. This will not exceed $10 per set of one or two volumes, as the case may be, and will probably be considerably less. Persons who wish to obtain a copy of these reports are requested to notify Richard Sachse, Chief Engineer, California Railroad Commission, 833 Market street, San Francisco.

Generated on 2024-09-30 01:40 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Grading Land for Furrow Irrigation

By G. E. P. SMITH*

One of the most difficult problems of irrigation engineering is to determine the best method of laying-out and grading a field for irrigation. Unfortunately, this subject is seldom studied from a scientific standpoint. Some entire valleys use methods that the early settlers brought with them from some other State, where soil conditions and topography were quite different. The people living in the valley may not know any other method of irrigation, nor whether or not their own method is best adapted to their conditions.

Most of the soils in Arizona are sandy, or sandy-clay loams. The slope of the irrigated lands is usually from 6 to 25 ft. per mile. The farmers have learned by experience fairly satisfactory methods for irrigating such lands, although much improvement could be made in present methods and would result in an increased duty of water. For steeper slopes, however, ranging from 25 to 100 ft. per mile, there are few examples under cultivation and little upon which an investigator can base his judgment. The increasing acreage of orchards and row-crops, including cotton, makes it particularly desirable to obtain more light with regard to furrow-irrigation on these comparatively steep slopes.

Most farmers believe that the slope must be reduced at all cost, and that the rows should run so close to the contours that the fall in the furrows does not exceed 8 or 10 ft. to the mile. Cotton-growers, in particular, are of this opinion. They assert that the best cotton is always found on the flattest slopes. The opposing view is that the furrows should run down the steepest slope, or at least should cross the contours at angles greater than 45°. For instance, if a tract of land slopes 20 ft. per mile to the north and 40 ft. per mile to the east, the water should run east with furrows parallel to the sides of the field. For this tract, running the furrows down the steepest slope would introduce short diagonal furrows, while the intermediate furrows would be unnecessarily long.

If we call the slope at right angles to the rows the cross-slope, the first method of grading gives a relatively heavy cross-slope and the second method a light cross-slope. A heavy cross-slope is troublesome. Unless the land has been graded with unusual care, sags or flat places followed by high spots, are likely to be present. The water will then run slowly and form ponds. In some weak place the water will break through from a furrow to the next lower one. With a double amount of water in that furrow, the process is likely to be repeated. Soon all the water is rushing across the furrows in the direction of the steepest slope. This is an unpleasant but frequent occurrence. The irrigator must then go upon the planted ground with slip-scrapers or other implements to repair the damage and to prepare the land for irrigation according to some better system.

This difficulty is not necessarily the result of imperfect grading. The wind may drift the sand into the furrows and form a dam against the water. Late in the season, weeds or lodged cotton may form an obstruction, or a flow of storm water from the upper side or from a road or tail-ditch may interrupt the continuity of the grade in the furrows. Gopher holes may also start the trouble. At any rate, a heavy cross-slope is a nuisance and a menace.

On some newly-graded cotton-lands this past season it was impossible to keep the water in the furrows. Rather than increase the fall in the furrows, the owners built terraces with ten rows in each division. Terraces alone will not suffice; the land must be leveled between the terraces. The cost of terracing and bordering land is considerable, sometimes as much as $10 to $15 per acre. Besides there is a loss of one row out of every eleven, or 9% of the total area. Once the land is terraced, plowing, especially with tractors, is hampered, and so also is the use of harvesting machinery. If the land is pastured during the fall and winter, the stock tramp paths across the terraces so that they are broken by the water when the land is irrigated again. Heavy grading is also objectionable because it may strip the fertile soil from a large part of the field. Therefore, if water can be run in steep furrows, why should not the land be graded in the simplest manner, by smoothing it and dividing it into a number of approximately plane surfaces, each plane having about the same slope given it by nature? This method saves money and saves land.

The question involves, therefore, the possibility of irrigating in steep furrows. Can the field be wetted uniformly? The efficiency of irrigation depends upon the uniformity of distribution even more than upon the average depth applied. If a large head of water is turned into each furrow, the soil may be washed and eroded, or, on a clay soil, the water may reach the lower end and have to be turned off before much has been absorbed. If the head is too small, and the soil is sandy, the water will be absorbed in the upper part of the field and the lower part will receive little or none. Evidently, the head should be the dependent variable. The best quantity to run in each furrow must be determined by trial. Different parts of the same ranch may require different heads.

The length of the furrow can also be varied, if taken

*Professor of Irrigation Engineering, University of Arizona, Tucson, Arizona.

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

in time. During the past summer one rancher in the Salt River valley ran water in furrows 330 ft. long. His neighbor across the road, when it came his turn, ran the same stream in furrows one-half mile long. There has been a loud cry among irrigation engineers for shorter 'runs,' especially in border-irrigation. Certainly much water is being wasted by the downward percolation of the water beyond the reach of plant-roots in the upper portion of the lands. On many farms, however, turning the direction of irrigation so as to get more slope or increasing the head in each division of land would be as effective a remedy as building intermediate head-ditches.

The character of the soil, the slope, the length of run, and the unit-head of water are interdependent. Any one may be taken as a function of the other three, and the efficiency of irrigation is a function of them all. On many new projects, the head of water desirable has been assumed arbitrarily and the slope for the furrows has been made to conform to the head. I believe that the rows and furrows should run down the steepest slope or in some convenient direction (such as parallel to a fence), making an angle less than 45° with the steepest slope. The length of run and the proper head of water for each furrow must be found by trial. Of course there are limitations; on porous silty ground, a slope of two feet per hundred should not be exceeded for furrow-irrigation, nor one foot per hundred for flooding. If the soil is gravelly or clayey and not easily eroded, still greater slopes are possible. Usually the length of run can be assumed from experience on other tracts, or part of the field may be graded and irrigated before any but the upper head-ditch has been opened.

If cement pipe-lines or cement-lined ditches are to be used for distribution of water, the interval between the head-ditches should be as great as efficiency and irrigation will allow, in order to reduce the cost. On some fields it may be wise to open temporary head-ditches midway between the pipe-lines for the preliminary irrigation and possibly for the first irrigation after planting. After the graded and plowed land has settled, it will be feasible to run water the whole distance from one pipe-line to the next. Another plan for overcoming the same difficulty is to run double heads in alternate furrows and subdivide them half-way down the field. I recently tried this plan when the upper part of the field had been getting most of the water applied. By running the double heads in alternate forrows and subdividing them, the lower portion of the field received more than the proper proportion of the water, but an even distribution was effected by further adjustment of the furrow 'head.' Again, cross or zigzag furrows can be used on the lower part of the field to increase the proportion of the water that it receives. This can also be accomplished by flattening the grade at the lower end. In the case of border irrigation, there should be one or two divisions of land running cross-wise of the field at the lower end. They will distribute and utilize the tail-water from the field.

To irrigate successfully in steep furrows presupposes effective means of dividing the water in the head-ditch into equal furrow-streams. The difficulty of doing this in the South-West, where large heads of water are the rule, may account for the preference that has been shown for flat-graded lands. The division should not be made in one stage. The head can be divided into two, three, or more heads by using division-boxes or gates, and each sub-head can then be divided equally into furrow-heads. Spiles, such as are used in the North-West, only larger, are effective in the final division. In desert regions, however, they should be of some other material than wood, which cannot withstand the alternate wetting and drying. The furrows should be given consideration also. By selection of the proper implement they can be made wide and shallow or narrow and deep. Young shallow-rooted plants require shallow furrows placed close to the plant. Some of the most successful cotton-farmers make two furrows between the 3-ft. rows for the first irrigation, and one furrow between rows for later irrigations.

On a 4000-acre ranch near Tucson two methods of dividing the water are being used. One method, used on the steeper slopes, is similar to the system used commonly in the orchards in southern California. The main supply-line and field-laterals are of cement pipe of sizes ranging from 8 to 20 in. diam. At 36-ft. intervals, tee-risers, capped with valves, are built on the pipe-line. Cement-pipe collars are built above the valves. These are perforated with four side-openings, each 2 in. diam. Each opening is connected successively with three furrows, so that each riser serves twelve rows. The other method is used on the flatter slopes of the river-bottom land. The risers are placed at wide intervals, from 75 to 200 ft. They discharge into open ditches directly over the pipe-lines. From each ditch the water is run into about 30 furrows at a time. For some ditches, control-plates of galvanized iron are used at the entrance to the furrows. These plates are 5 by 18 in. with a shallow notch on the top-edge. They are driven or set in the ground, and have the advantage over spiles that they are seldom disturbed by the cultivator. Large streams are taken into the furrows at first. When the water has nearly reached the lower end, the streams are reduced by opening more furrows. On silt-loam soil with a slope of 20 ft. per mile, fields 1000 ft. long are successfully irrigated in this way.

Farmers in the Yuma valley prefer to grade lands level from end to end. This is expensive. In the Salt River valley the general custom is to run water parallel to the steeper side of the field. The alfalfa-growers recognize that the greater the longitudinal slope the longer the runs may be. Even under the new Highline canal, where slopes of 80 ft. per mile exist, steep longitudinal slopes are used, but on some farms the furrow-streams used are too large aand the soil is eroded badly. In north-eastern Arizona the corrugation method is used and the water is run down the steepest slopes.

Generated on 2024-09-30 01:45 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

On account of the complexity of conditions, general principles of irrigation are difficult of statement. I believe, however, that discussions such as the above lead to more study of local conditions and to a more scientific and economical distribution of water on the part of those in charge of irrigation systems.

WAR-STEEL PRODUCTION

*Statistics have shown that the steel-ingot production in the United States in July was at the rate of 44,000,000 tons per year. An excellent authority compiled a statement last August revealing that the existing ingot-capacity was 49,500,000 tons, and that an additional 3,800,000 tons capacity was under contract, to be completed within six months. Finished rolled-steel production amounts to 76% of the ingot-production, hence the output for finished rolled steel was at the rate of 33,000,000 tons in July, at which season the production is generally about 5% below the year's average. Allowing for a considerable shortage of coke, even after the by-product ovens under construction are completed, we should be able to count upon 48,000,000 tons of ingots and 36,000,000 tons of finished rolled steel. The 11,500,000 tons of war-steel already included would be 32% of the output. The percentage is likely to be under rather than over 32%. If, under the stress of labor shortage, transportation difficulties, and other circumstances growing out of the War, the output should be restricted more than is here allowed for, there is good reason to believe that the commercial requirements in steel will be even more restricted, so that the essence of the argument is not affected, namely, that there is no serious danger of a decided shortage of commercial steel.

The distribution by the Government of orders on behalf of its Allies succeeds to such buying as these Allies have hitherto been doing on their own account. Last year's exports of steel under orders from the Allies amounted to about 5,200,000 tons. The steel consumed in making shells, machinery, and all other steel manufactures, has been estimated at about 1,800,000 tons, making a total of 7,000,000 tons of rolled steel for 1916 involved directly and indirectly in the export trade. The production was 30,500,000 tons, and thus 22,500,000 tons was left for the domestic trade. That is approximately the same amount as was consumed in 1912 and 1913, the best years before the War. Of the 7,000,000 tons involved in exports one may guess that something like 5,000,000 tons was included in exports to the countries now our Allies. The present war-steel programme absorbs the tonnage, whatever it was. There is every reason to expect that, as long as steel is scarce in the United States, the Government will not permit exportation to neutrals, hence, for the purpose of this argument, such exports may be neglected. The result is that, if we accept the figures of 11,500,000 tons of steel for the war programme in 1918, and the total production at 36,000,000 tons, there is left 24,500,000 tons for domestic commercial consumption, against 22,500,000 tons in 1916. It is difficult to see how this consumption could possibly increase, there being so many directions in which it is visibly decreasing. The greatest pinch will come to ship-plates. The production of mills that can roll such plates was only about 1,800,000 tons in 1916. The largest figure yet set upon American shipbuilding in 1918 is that used by the British controller of shipping, who recently authorized the Associated Press to say that he would like to see 6,000,000 tons of shipping built in the United States in 1918. He set the amount of steel involved at 3,500,000 tons, which is a rather high proportion of the gross tons of steel to the gross register of the vessels. Deduction should be made for wooden ships in the programme of expansion for the merchant marine. There would be required, then, say 2,500,000 tons of ship-plates for our shipyards. This we can furnish, and some plates in addition for foreign yards, possibly 3,600,000 tons in all, or double our production of this class of plates last year, but certainly there will be no plates, except those not available for shipbuilding, for ordinary commercial purposes.

*Abstract: 'The American Metal Market'.

POTASH FROM CEMENT DUST

Between 71,000 and 75,000 tons of potash, about one-third of the quantity normally consumed in the United States, could be recovered per year from the dust passing through or retained in the flues of the cement-manufacturing plants of the country, according to analyses made by the Bureau of Soils of the United States Department of Agriculture, and discussed in Department Bulletin 572. By increasing the proportion of potash volatilized, which can be done by the addition of substances that will not affect the quality of the cement, the recoverable potash in flue-dust could be increased to more than 100,000 tons per year.

Several companies have constructed electric precipitation-plants to recover the flue-dust, and have found them profitable. Some plants are recovering 95% of the potash in the raw materials fed into the furnaces. The dust recovered in the flue-stacks, connecting-kilns, and precipitation-apparatus contains 4.5% potash, while that recovered from the precipitation-apparatus itself contains 11% potash. The dust may be used as a source of cement-material, may be sold as collected for use either as a fertilizer or in fertilizer manufacturing, or may be leached to prepare concentrated potash salts.

A tank-steamer with no reciprocating machinery in the engine-room is being built in a shipyard on the Delaware. The propelling engine will consist of a low and a high-pressure turbine geared to a single propeller, a surface-condenser with a centrifugal pump driven by a turbine, two centrifugal hot-well pumps also driven by a turbine, and a rotary oil-pump for the turbine and gears, driven from the main gears.

Generated on 2024-09-30 01:45 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Displacement-Tanks

By WALTER S. WEEKS

The general principle of displacement-tanks for measuring the air-consumption of rock-drills is known to most engineers, but it takes a good deal of experimenting to construct them so that they will work properly. It is hoped that these few suggestions will be helpful.

The elements of the displacement-tanks are two closed tanks connected with a pipe at the base and equipped with valves so that air may enter one while leaving the other. The air in the two tanks is always separated by a piston of water, which flows back and forth from one tank to the other. The change in level of the water in one tank multiplied by the area of the tank is the volume of air that has flowed out.

It will occur at once to the reader that there are two possible ways of measuring the volume of air displaced. In the first method we place on one tank a gauge-glass that reaches from the top to the bottom. We can read the gauge-glass at the start and after a given elapsed time, say, a minute, read it again. From these readings we can compute the flow of air per minute. The main drawback to this method is that the tanks must be perfectly regular from top to bottom, or else the volume must be calibrated in many places.

In the second method we place two small gauge-glasses on one tank, one at the top and one at the bottom, and find the volume between two marks on the glasses. If we take the time for the water to rise from the lower mark to the higher with a stop-watch, the volume flowing per minute can be calculated. With this type of meter, tanks of any shape can be used.

The air entering the tanks must do so at constant pressure. A reducing-valve is needed. I have tried many kinds and the most satisfactory one is comparatively inexpensive. It is made by the Westinghouse Air Brake Co. and is known as the S 4 locomotive governor. The price is $21. It should be fitted with a hand-wheel so that it may be regulated easily. It should be arranged as shown in Fig. 1 (*a*). (All references will be to Fig. 1 unless otherwise specified.) The control-pipe *b* should not be connected to a tank because the valve continuously exhausts air to the atmosphere. A lubricator *r* should be placed on the control air-line feeding very thin oil to the valve.

The air, after passing the reducing-valve, must enter first one tank and then the other and when it is entering one it must be leaving the other. These operations require a four-way valve. The stock four-way valve is costly and generally leaks. An excellent four-way valve can be made with four single valves *c* arranged as shown, with levers, so that they can all be thrown together. The valves are made by the Westinghouse company and are known as 1-inch cut-out valves. They cost $1.80 each. In the pipe *d* connecting the tanks at the bottom should be placed a quick-closing gate-valve *e*. It is necessary to measure the volume of but one tank. Glancing at Fig. 1, place a mark on the gauge-glass *f* and fill with water to that point through the pipe *g*. Close the gate-valve. Draw off water through the pipe *g*, carefully measuring it until it comes in sight on the glass *h*. Now draw carefully until an even number of cubic feet is reached and mark point on the glass *h*. When the water in tank II rises from the lower mark to the higher, the measured volume of air has been displaced.

To obviate the necessity for watching the gauge-glasses

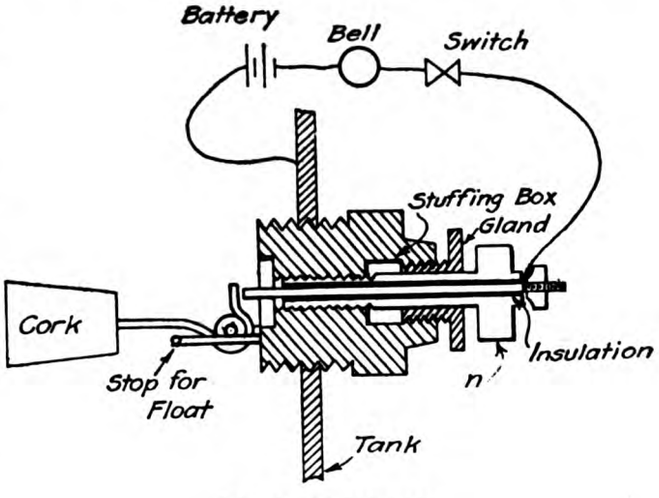


FIG. 2. CONTACT-PLUG

I have arranged for a bell to ring at the two critical points. It is done by fitting up spark-plugs so that a contact is made between the tank and the sparking point of the plug by means of a float. The principle is shown in Fig. 2. An ordinary automobile-plug fitted with a float is tapped in at *i*. A plug built as shown in the drawing is placed at *k*. The plug is so constructed that the point of ringing can be controlled by screwing the centre point in or out. The plug *k* is placed on a line with the mark on the gauge-glass. A water-glass should be placed opposite the plug *i*, as shown.

To put the apparatus in working order the water is run up in tank I until the bell rings. The gate-valve is closed and the water in tank II is brought to the lower mark. The gate-valve is then opened and the water is forced to the upper mark. The gate-valve is again closed and the spark-plug *k* adjusted by turning the nut *n* (Fig. 2) until the bell rings at this point. Thus it is seen that

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

between two ringings of the bell the measured volume of air has flowed out. The time is taken with a stop-watch.

To test a drill, connect the hose at 1 and start the drill running. Run water into tank I until the bell rings. Throw the valves and while the water is falling to the level of the spark-plug *i* adjust the reducing-valve. Start the stop-watch when the bell stops ringing and stop it when the bell starts again by contact being made at *k*. To hold the pressure constant the reducing-valve must be changed slightly owing to the small change in hydraulic head on the air. A run of any duration may be made by throwing the valves at each ringing of the bell and keeping account of the number of throws.

The volume between marks on tank II should be about 16 or 18 cu. ft. for ordinary drill-testing. Means should be provided to exhaust the air in the tanks to the atmospheric pressure if necessary. In the tanks shown in the drawing it is accomplished by a three-way valve at *m*. Charts may be plotted for different gauge-pressures with time in seconds between bells, against free air per minute.

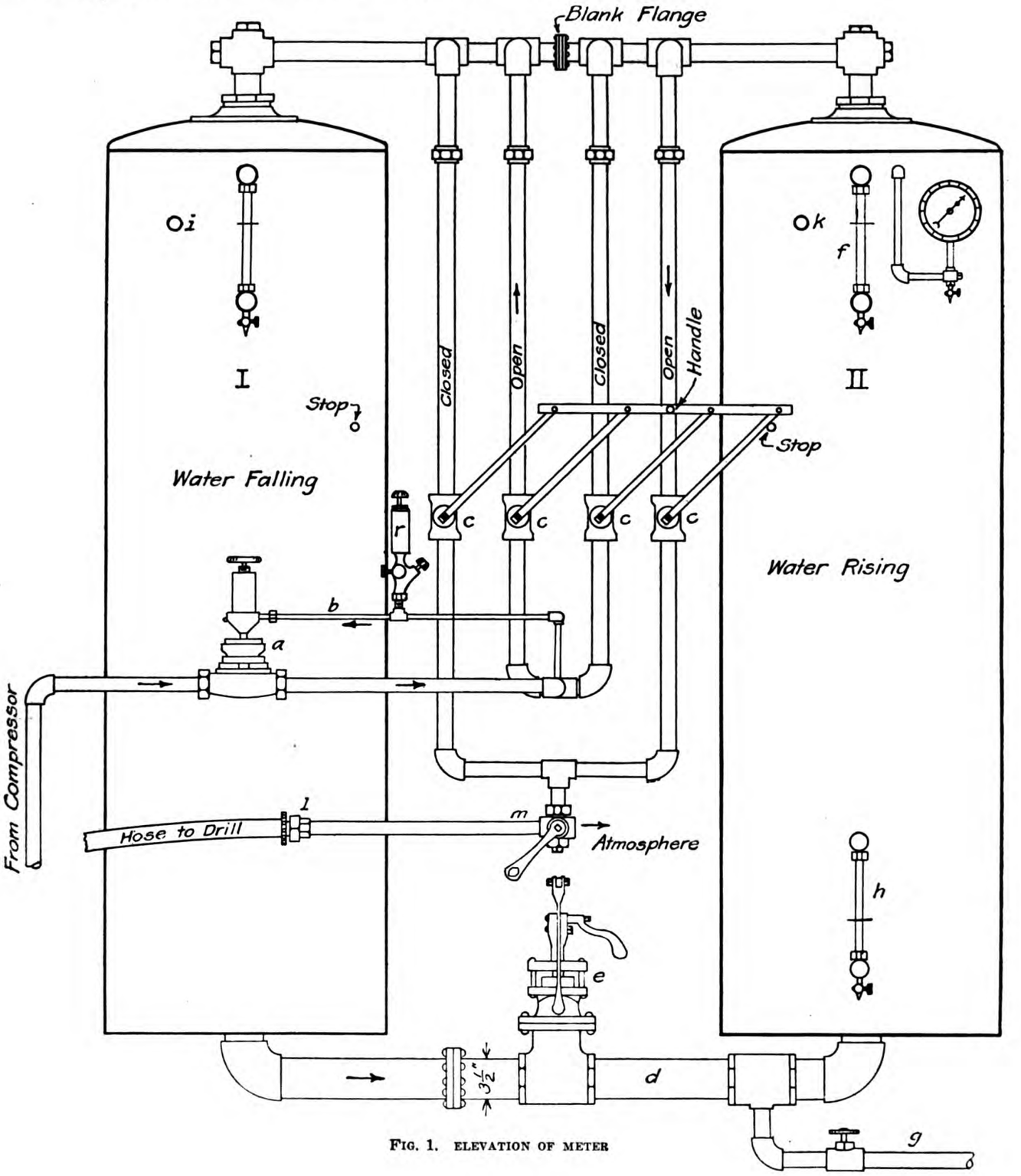


FIG. 1. ELEVATION OF METER

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Rittman and Other Cracking Processes*

By H. G. JAMES

Three years ago the petroleum world was startled by an announcement from the U. S. Bureau of Mines that Walter F. Rittman, then connected with the department, had discovered a process for cracking products of petroleum and increasing the amount of gasoline obtained at least 100%.

Refiners were convinced that Rittman had discovered a scientific principle of distillation, but they were not satisfied that he had found the mechanical means of applying it. The Western Petroleum Refiners Association subscribed a fund and proposed to put in an experimental plant, but they wanted some preferential consideration, which the department refused to grant. The Aetna Explosives Co. erected two expensive plants at Pittsburgh and made toluol and benzol from crude oil, by first converting it into synthetic crude. It was announced that the Mid-West Refining Co., Casper, Wyoming; the Indian Refining Co., Lawrence, Illinois; the Penn American Refining Co., Oil City, Pennsylvania; and the Island Refining Co., Pittsburgh, had taken out licenses and were erecting Rittman plants. Several licenses were issued to Mid-Continent refiners. The Island Refining Co. constructed a Rittman plant. Soon after it was completed it was closed to the public. It was announced, however, that the company was about to install additional Rittman tubes. Then all information concerning these various experimental plants ceased.

Mr. Rittman left the Bureau of Mines and organized the Rittman Process Co., with headquarters at Pittsburgh. This company had a precarious existence, and finally Mr. Rittman retired from it.

Now, after three years, the world is to know what virtue there is in the Rittman theory. In addition to the Rittman-Day plant at Casper, the Gulf Refining Co. has just completed and is now testing a 10-tube plant erected at the company's refinery at Port Arthur, and the Empire Refineries is also finishing a 10-tube plant at Okmulgee, and Mr. Rittman and associates have a plant in course of construction at Tulsa.

The Okmulgee plant is the one to which oil-men will probably look for the best test. It is independent of the Doherty refinery at that point, having its own boilers, agitator, condensers, and other equipment. In other words, it is a complete refinery in itself. The Rittman tubes are made of 12-in. extra-heavy pipe, 11 ft. long. They are set in brick furnaces, with direct heating, each tube being encased in combustion chambers made of fire-brick. The plant cost approximately $135,000. In the published reports of the early Rittman plants complain was made of the losses in escaping vapors. In the Okmulgee plant there will be no waste gases. The condensible gases will be precipitated and the non-condensible gases will be carried to the furnace for fuel. In the early plants the condensers were inadequate. This complaint cannot be made of the Okmulgee plant.

The 10 tubes will have a daily capacity of 1000 bbl. of distillate or gas-oil. The first Rittman plants used residuum and heavy oils entirely. The Casper plant will use any kind of oil, light or heavy. The Empire people refuse to make any guess at what they will secure in the way of results, but those who are familiar with the construction and experiments believe that 45 to 50%, and possibly more, of the distillate will be converted into gasoline.

The Empire plant was constructed under the supervision of W. A. Williams, who was at the head of the petroleum department of the U. S. Bureau of Mines when Rittman was connected with that department. Mr. Williams has always had confidence in the Rittman process and he believes that the plant he has just constructed will prove a success.

The most successful Rittman plant, however, is the one built under the supervision of David T. Day, formerly petroleum statistician for the U. S. Geological Survey, in connection with the Mid-West Refining Co.'s plant at Casper, Wyoming. The Mid-West Refinery now belongs to the Standard companies.

The work at Casper was started more than a year ago. The first plant was a failure. The tubes were too large, and numerous other defects developed, but the company gave Mr. Day a free hand. He re-built the plant with surprising and gratifying results. At present, four 8-in. tubes are used. These will run 120 bbl. of raw material per day and will handle any kind of oil with equal ease. The gasoline produced is a motor-fuel of fine quality, not in the sense of high gravity, but in its readiness to ignite and produce power in internal-combustion engines. This four-tube plant cost $5000, but a larger plant can now be erected at a lower cost per unit. In the original Rittman stills, 500 and 600 lb. pressure was used, as against 80 lb. in the present plant. At first it was thought necessary to have the temperature from 1100° to 1400°F. This has been reduced to between 700° and 900° Fahrenheit.

It must be understood that when Mr. Rittman erected his first plant it was to make benzol and toluol for high explosives and this required greater temperature. He always maintained that eventually both heat and temperature would be reduced. There is no waste

*From a series of articles on 'The Oil-Refining Industry' in the 'Oil City Derrick.'

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

gas at all in the Casper plant. The plan is economically constructed and the tubes will probably last a year without replacement. In addition, less expensive tubes can be used than in earlier experiments. More tubes can be added easily in order to increase the capacity.

This plant should increase by 200% the precipitation of gasoline from crude oil, either by the cracking of residuum, distillate, or other products. That is to say, if a refinery is getting a total of 25% of gasoline from its crude oil by present methods, it will be able by cracking the various heavier products in a Rittman-Day plant to produce 75% of gasoline, possibly more. J. S. Cosden is confident of converting 80% of distillate into gasoline by his process, only he cannot handle heavier oils with equal success. Quite a number of refiners are contracting for Cosden permits. If the Rittman-Day, Cosden, and Burton processes will do what is expected of them, there need be no fear of a gasoline shortage for a long time to come, for it will be possible to make just as much or more gasoline from a given amount of heavy Californian oil by the Rittman-Day process as we are now making from the best grades of Eastern oil. The same may be said of other heavy oils, such as those produced in Mexico. In fact, so far as the oil business is concerned, nothing more important than Mr. Day's work in Wyoming has been done in half a century.

There can be no doubt concerning the possibility of more efficient distillation of petroleum. We have lost millions of dollars in the past through lack of knowledge and because of unwillingness to devote the necessary time and expense to research. Many experimental distillation plants are being erected now in the different fields and some surprising results are being obtained. There is a tendency when a semblance of success is obtained to hedge the experiments with secrecy. Thus a great deal of important work, which means much to the future of the industry, especially in the conservation of the raw material, is being done quietly.

All experiments are not necessarily for increasing the precipitation of gasoline or motor fuel. Take, for instance, the Julius Hansen process. It increases the yield of several products from crude oil. In basic principles it resembles the Rittman notion, but uses fuller's earth as a catalyzer. Rittman does not use a catalyzer. Rittman's equipment is expensive; Hansen's is not. It is economically operated because the stills can be kept clean. The temperature required is only 680°F. Mr. Hansen uses heavy fuel-oil or residuum as his crude or raw material, and he keeps an 8 by 8-ft. still going continuously for ten days, starting half full and adding crude oil as the finished product is withdrawn. From a 22° B. fuel-oil, 7% naphtha and a large amount of lubricating-oil is obtained. The Gulf and Roxana companies are testing the Hansen method. This method of distillation is especially successful in handling Mexican crude oil. It has some resemblance to the Wells process in its final results, though different in operation.

TRAFFIC-CARRYING CAPACITY OF VARIOUS ROAD SURFACES

The following statements are based on a report of the Massachusetts State Highway Commission:

A good gravel road will wear reasonably well under a daily traffic composed of 50 to 75 light teams, 25 to 30 loaded one-horse vehicles, 10 to 12 loaded wagons drawn by two or more horses, and 100 to 150 automobiles. For a larger number of automobiles, the surface should be oiled. Oiled gravel will 'stand up' faily well under 75 to 100 light teams, 30 to 50 heavy one-horse vehicles, 20 heavy wagons with two or more horses, and 500 to 700 automobiles daily.

Water-bound macadam will carry a daily traffic of 175 to 200 light teams, 175 to 200 heavy one-horse vehicles, and 60 to 80 heavy wagons with two or more horses. If even 50 to 100 automobiles per day go over the road at high speed, dust-layers will be serviceable. With a really good dust-layer the road will stand 300 to 500 automobiles per day, although the stones will wear.

Water-bound macadam with an oil-and-sand blanket, applied hot, will be economical with 150 to 200 light teams, 75 to 100 heavy one-horse vehicles, 25 to 30 heavy wagons with two or more horses, and automobiles up to 1400, or more with fewer teams and with 50 or more motor trucks. The larger number of automobiles seems to keep the oil rolled when it would cut and crumble without this traffic. This same road, however, will cut and crumble under a traffic of 100 heavy one-horse vehicles and 50 heavier wagons with narrow tires.

ACCIDENTS ON CONSTRUCTION-WORK IN CALIFORNIA

In the State of California during 1916 there were 12,938 industrial injuries to workmen engaged in general construction-work. The deaths numbered 107, the permanent injuries 298, and the temporary injuries 12,533. As of June 30, 1917, there was paid the sum of $537,783.49 for compensation and medical cost. This sum was divided as follows: Compensation, $345,-835.57; medical cost, $191,947.92. The last amount will not be materially increased but the sum paid for compensation will probably be increased by $165,462.88, because of the weekly compensation for deaths and permanent injuries. The latter include two life-pensions. The 12,938 construction injuries will result in payments approximating $703,246.37. The time loss for the 12,533 temporary injuries was 146,292 days.

The equatorial radius of the earth has been computed by the U. S. Coast and Geodetic Survey to be 6,378,283 metres, while the polar radius is 6,356,868 metres. These values are within 34 metres, or 120 ft. of the actual length. The flattening at the poles is between 10/2987 and 10/2968 of the radii, with 10/2978 as the most probable value.

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Drainage of Irrigated Lands*

By J. L. BURKHOLDER

Seepage usually results in one of two ways, either from a rising of the ground-water above its original level or from the retention of applied irrigation-water by an impervious stratum at a comparatively short distance from the surface. Seepage caused by a general rising of the ground-water usually involves larger areas, and is more common than that caused by impervious strata. In the former case, the underground-water passages, which are sufficient in capacity for the ordinary flow of underground water, are choked by the added irrigation-supply, and a gradual ponding in the soil takes place. In the winter, when the irrigation-water is wholly or partly shut off, the ground-water surface lowers, only to rise again to a greater elevation during the succeeding irrigation season.

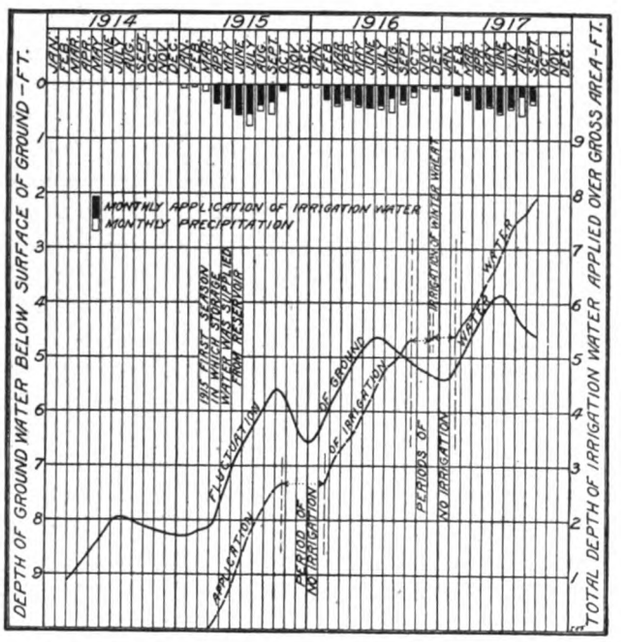


FIG. 1. GROUND-WATER FLUCTUATIONS AND USE OF WATER IN RIO GRANDE VALLEY

The surface of the ground-water is represented by a series of peaks and valleys, which correspond to the seasonal use of water on the land. The peaks increase steadily in height, and finally reach the ground-surface at low points. Water stands in these during the irrigation season, only to disappear during the winter. Fig. 1 shows the fluctuation of ground-water and the application of irrigation-water on 8500 acres in the Rio Grande valley. The ground-water curve is based on the records of 20 wells in various parts of the tract. The net area irrigated was 5300 acres, and the average depth of water applied was 4.3 ft., corresponding to 2.7 ft. over the entire 8500 acres. Where the water stands on the surface, or where the ground-water level is near enough to the surface to be affected by capillary attraction, the resulting evaporation causes the deposition of 'alkali' salts.

The flow of underground-water, like the flow of sur-

*Abstract from 'Reclamation Record.'

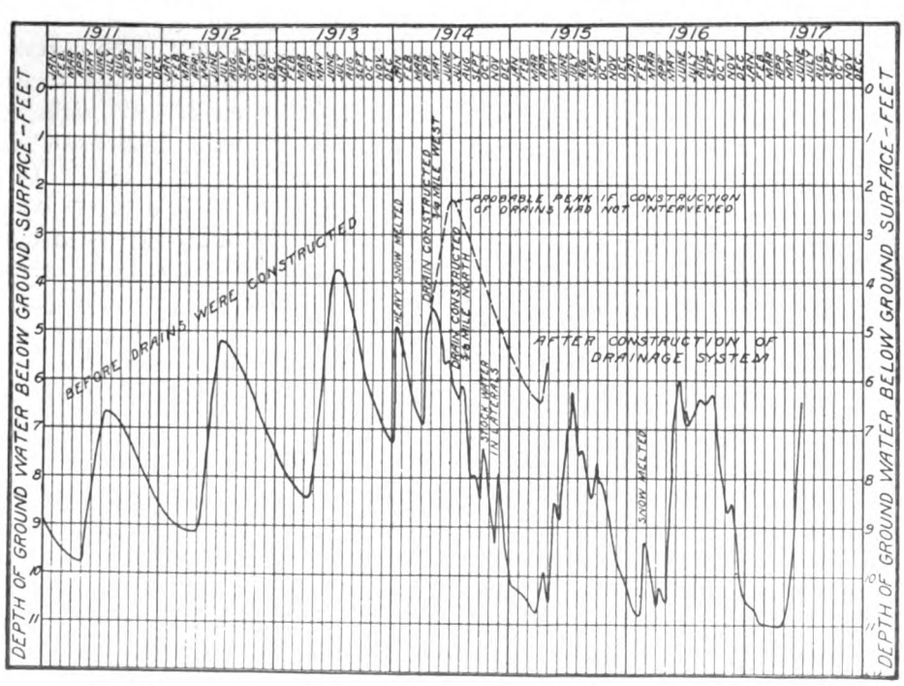


FIG. 2. GROUND-WATER FLUCTUATIONS IN PART OF BOISE VALLEY, IDAHO

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

face-water, follow the direction of greatest slope, but on account of friction of the soil-particles, the movement is slow. If irrigation losses are large, the supply of ground-water exceeds the amount handled by natural movement and there is seepage, even on land with a considerable slope.

Deep drains keep the ground-water level at a sufficient depth below the surface to prevent the rise of 'alkali'. They do not empty the underground reservoir, but simply reduce the peak of the ground-water surface.

A study of Fig. 1, 2, and 3 shows that the loss of a comparatively small quantity of water by deep percolation necessitate the construction of an extensive drainage system. In Fig. 1, note how closely the curve representing the ground-water responds to the use of irrigation-

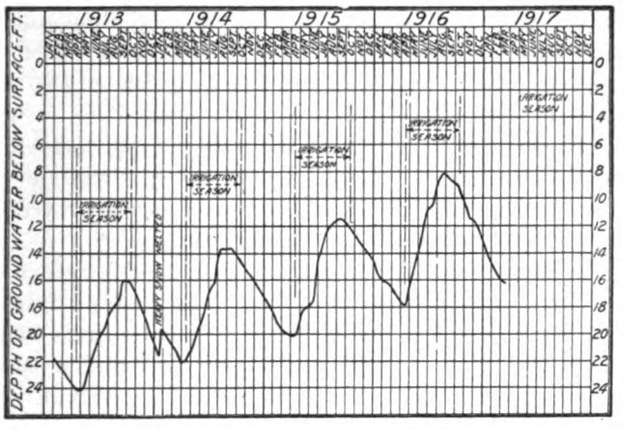


FIG. 3. GROUND-WATER IN BOISE VALLEY, IDAHO

water. This curve drops rapidly when irrigation stops, showing the effect of the natural underground drainage.

The financial loss caused by deep percolation does not stop with the construction of a drainage system. Drains are not a 'cure-all' for seepage. After each irrigation a 'peak' of ground-water remains, the size depending on the care taken by the irrigators. This ground-water must spread laterally and enter the drains, if the soils are to be properly aerated and injury from 'alkali' prevented. If there is a continual overabundance of water applied this 'peak' remains so close to the surface to to make the root-space shallow. In addition, much of the plant-food is removed by the continual motion of free water in the soil.

Compressed peat-litter has been used in Berlin as an insulating material against both sound and heat. It was applied in plates 1 in. thick, weighing 1.3 to 2.5 lb. per sq. ft. according to the amount of compression. Such plates have a compressive strength ranging from 280 to 1400 lb. per square inch, according to the method of manufacture, and are therefore suitable as a substitute for linoleum and other flooring. They cost about $0.50 per square yard. The plates are protected against dampness and insects by means of asphalt, which is used for attaching them to each other.—'Mechanical World.'

IMPROVEMENT OF WATER CONDITIONS IN KERN RIVER OILFIELD

The work done under the direction of the California State Mining Bureau in shutting off the water in well No. 2 of the Alma Junior Oil Co. on Section 4, Township 28 South, Range 28 East, has improved water-infiltration conditions in that part of the Kern River oilfield. The repair-work required five months and cost about $10,000. As a result it has been possible to cease operating two compressor-plants. The total saving in operating expense is about $115 per day, in addition to which the value of the increased production of oil from the wells affected is $35 per day, or a total of $150 per day.

The daily production of oil and water from the wells affected, both before and after repairs, is shown in the following table:

ALMA JUNIOR OIL COMPANY

	Before repairs		After repairs	
	Oil	Water	Oil	Water
	bbl.	bbl.	bbl.	bbl.
No. 1	trace	150	7	00
No. 2	00	12,000	trace	100
No. 5	trace	200	10	trace
No. 11	trace	250	7	40
No. 12	trace	200	10	25
PETROLEUM DEVELOPMENT COMPANY				
No. 1	3	32	4	10
No. 2	00	1,440 (not rigged for pumping)		
No. 6	5	250	4	20
No. 10	5	400	5	10
No. 14	5	5	5	10
No. 18	7	1,000	7	25
Totals	25	15,927	59	240

The longest line in the primary-triangulation work of the U. S. Coast and Geodetic Survey is from Toiyabe dome, Nev., to Ragged peak, Nev., 227 miles. This, however, was observed in only one direction. Other long lines are as follows:

Mount Shasta, Cal., to Mount Helena, Cal., 192 miles.

Mount Ellen, Utah, to Mount Uncompahgre, Colo., 183 miles.

Wheeler peak, Nev., to Mount Nebo, Utah, 148 miles.

Mount Nebo, Utah, to Pilot peak, Nev., 148 miles.

Pilot peak to Wheeler peak, 141 miles.

Mount Conness, Cal., to Mount Diablo, Cal., 142 miles.

Mount Lola, Cal., to Mount Diablo, 136 miles.

An electric furnace of a new type has recently been constructed in Sweden. It is especially useful as an economical unit for crucible-works and steel-foundries. In addition, it may be made suitable for copper smelting, glass melting, and for melting various alloys. The furnace is of the arc type, but differs from existing furnace; it is cylindrical, with closed ends. Two of the electrodes enter the furnace horizontally, one in the centre of each end; the third electrode is vertical, entering at the top in the centre.—Mechanical World.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

FACTORS AFFECTING THE ECONOMIC USE OF IRRIGATING WATER*

By W. L. POWERS†

Soil-texture affects the irrigation requirement. The coarse soils require the most water. These soils generally have a comparatively low amount of surface-area, pore-space, and organic matter, and are likely to be medium in fertility. The light frequent irrigations required on these soils necessitate more waste. It is impracticable to use as small an amount of water on these soils as on the soils of finer texture.

The kind of crop affects the amount of water required. Alfalfa and other meadow crops require large amounts of water; grain and field-peas medium amounts; cultivated crops, such as potatoes, still less.

The altitude and accompanying climatic conditions affect the irrigation requirements. While the data are not sufficient for absolute deduction, it may be said that in general for the same soils and crops where 3 ft. of water is needed per season up to 2000 ft. elevation, 2 ft. is a reasonable amount at 3000 ft. elevation, and 1½ ft. for elevations of 4000 ft. or more.

Soil-fertility is one of the most important factors affecting irrigation requirements. Where there is a good supply of available plant-food, the plant does not have to consume much water to secure the nourishment that goes to form a pound of dry matter. In several of our experiments the application of fertilizer has saved from a quarter to one-half the water or else doubled the returns per unit of water. This is especially true on light soils.

The time of irrigation affects the efficiency of the water applied. In previous experiments at Corvallis water was applied according to the moisture content of the soil. It was found that as much as 50 bushels more of potatoes per acre could be secured by applying water at just the right time. For the brown silt loam at Corvallis, this was when the moisture content of the top foot of soil dropped to 20%. Clover gave the best returns when the moisture content of the top two feet had dropped to the 14% point.

The amount applied at each irrigation will affect the economical use of water or irrigation requirement. If the amount applied is more than the capacity of the soil strata within reach of the roots, loss from deep percolation will follow. Coarse-textured soils or those with gravelly sub-strata should have a distribution system that will permit light and frequent applications that can be retained in the soil without percolation-loss.

The frequency of irrigation is related to the time and amount for each irrigation. Except where flood-irrigation in the early spring is necessary in order to retain as much water as possible in the soil-reservoir, water should be applied only when the moisture content drops to near the wilting-point for the particular soil and crop and should be in sufficient amounts to soak the soil.

The method of applying water affects the water requirement. The head and length of run should be such that the plot irrigated can be covered by the time the root-zone of the crops has become saturated. A high head covers the land rapidly. This is necessary in flood-irrigation or in irrigating loose soils. A longer run gives more time for soaking the heavier-textured soils. Long runs can be used on sloping land. Short runs with a high head should be used on flat lands in order to cover the land without waste. On the small farm and with a small head, the furrow system will save water better than flooding systems.

The kind of ditches has a bearing on the amount of water used. Small direct ditches will save water as compared with broad shallow ones, which expose the water to evaporation and percolation-loss.

The skill and economy of the irrigator are important factors affecting economical use of water. Careless use of irrigation water results in loss, which can be prevented almost entirely by skillful management.

Economical use of water depends upon the method of purchase and delivery of water. The best plan is to practice rotation in use of water and get a high head, which will give an even and rapid distribution while the water is on the farm. A higher duty is obtained by this method than by having a small continuous flow during the entire season. A higher duty may also be obtained where the irrigator pays in proportion to the amount of water delivered, for this invites economy in the use of water.

*Based on experiments in eastern Oregon, 1915-1916, reported in Station Bulletin 140, Oregon Agricultural College Experiment Station, Corvallis, Oregon.

†Professor of drainage and irrigation, Oregon Agricultural College.

SURFACE IMPERFECTIONS IN CONCRETE

Imperfections in the exposed surfaces of concrete are usually the result of one or more of the following ten causes:

1. Variations in the cement, sand, or stone.
2. Lack of uniformity in the amount of ingredients in each batch.
3. Insufficient mixing.
4. Lack of care in placing the concrete next to the forms.
5. Lack of proper protection in placing concrete.
6. Efflorescence and discoloration of the surface.
7. Unsightly construction joints.
8. Imperfectly made forms.
9. Dirt on the forms.
10. Adhesion of forms.—'Concrete-Cement Age.'

The average cost of highway maintenance in Maryland has been computed to be 0.4c. per ton-mile of traffic. In the thinly-settled parts of the State the cost is as much as 0.8c. per ton-mile, while on the principal roads near Baltimore the cost is as low as 0.2c. per ton-mile.

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Effect of Mouthpieces on Flow of Water

An elaborate series of tests was recently made by Fred B. Seely on the effect of mouthpieces on the flow of water through a submerged short pipe. These experiments were made with the advantage of the excellent hydraulic equipment of the Engineering Experiment Station of the University of Illinois, and the results have been issued as Bulletin No. 96 from the Station. The data are given in detail, and are reduced to mathematical expression, accompanied by tables and curves. The conclusions reached are the following:

The preceding discussion has shown that the losses accompanying the flow of water depend largely upon the state of its motion, and this in turn is influenced by many factors, the effects of which often can be but roughly estimated. While the results of the experiments tend to define the range of such effects for certain conditions of flow, additional experiments would be necessary to establish all the inferences that have been suggested. The conclusions here given, however, seem justified:

(*a*) As applying to conditions likely to be met in engineering practice, the value for the head lost at the entrance to an inward-projecting pipe, that is, without entrance mouthpiece and not flush with the wall of the reservoir, is 0.62 of the velocity-head in the pipe ($0.62\frac{v^2}{2g}$) instead of $0.93\frac{v^2}{2g}$, as usually assumed. To put it in another form, the coefficient of discharge for a submerged short pipe with an inward-projecting entrance is 0.785 instead of 0.72 as given in nearly all books on hydraulics. Further, the lost head at the entrance to a pipe having a flush or square entrance is 0.56 of the velocity-head in the pipe ($0.56\frac{v^2}{2g}$) instead of $0.49\frac{v^2}{2g}$ as usually assumed. In other words, the coefficient of discharge for a submerged short pipe with a flush entrance is 0.80 instead of 0.82 as given by nearly all authorities.

(*b*) The loss of head resulting from the flow of water through a submerged short pipe when a conical mouthpiece is attached to the entrance end, may be as low as 0.165 of the velocity-head in the pipe ($0.165\frac{v^2}{2g}$) if the mouthpiece has a total angle of convergence between 30° and 60° and an area of ratio of end-sections between 1 to 2 and 1 to 4, or somewhat greater. In other words, the coefficient of discharge for a submerged short pipe with an entrance mouthpiece, as specified above, is 0.915.

(*c*) The loss of head which occurs when water flows through a submerged short pipe having an entrance mouthpiece varies but little with the angle of the mouthpiece if the total angle of convergence is between 20° and 90°, and if the area-ratio is between 1 to 2 and 1 to 4, or somewhat more. The loss of head for any mouthpiece within this range would be approximately 0.20 of the velocity-head in the pipe ($0.20\frac{v^2}{2g}$). There is, therefore, little advantage to be gained by making an entrance mouthpiece longer than that corresponding to an area-ratio of 1 to 2. Thus, an entrance mouthpiece, with a total angle of convergence of 90° and the length of which is only 0.2 of the diameter of the pipe, gives approximately $0.20\frac{v^2}{2g}$ for the loss of head.

(*d*) The amount of velocity-head recovered by a conical mouthpiece when attached to the discharge end of a submerged short pipe depends largely upon the angle of divergence of the mouthpiece, but comparatively little upon the length of the mouthpiece. This is true for lengths greater than that corresponding to an area-ratio of 1 to 2 and for total angles of divergence of 10° or more. The amount of velocity-head recovered decreases rather rapidly as the angle of divergence increases from a total angle of 10° to 40°. At or near 40° the amount of velocity-head recovered rather abruptly falls to approximately zero.

(*e*) A conical discharge mouthpiece, having a total angle of divergence of 10°, and an area-ratio of 1 to 2, when attached to a submerged short pipe, will recover 0.435 of the velocity-head in the pipe, which is 58% of the theoretical amount of recovery possible.

(*f*) The amount of velocity-head recovered by a diverging or discharge-mouthpiece, when attached to a submerged short pipe, is considerably more when a converging or entrance-mouthpiece is also attached than it is when the entrance end of the short pipe is simply inward-projecting, that is, with no mouthpiece attached. This excess in the velocity-head recovered diminishes rather rapidly as the angle of the discharge-mouthpiece increases, and it becomes zero for a discharge-mouthpiece having a total angle of divergence of approximately 40°. This increase in the velocity-head recovered is probably due to the effect of smooth flow in the pipe as the water approaches the discharge-mouthpiece. The smooth flow allows the mouthpiece to recover more of the velocity-head in the pipe than when a more turbulent flow exists; this increase amounts to as much as 33% in the case of the discharge-mouthpiece having a total angle of divergence of 10° and an area-ratio of 1 to 2.

While these conclusions are drawn from experiments on the flow of water through a particular short pipe having various entrance and discharge conditions, it is felt that the results of the experiments are applicable in a general way to a large variety of cases in engineering practice where the contraction and expansion of a stream of water occurs.

The deductions made are capable of use in connection with the loss of head which occurs when a stream contracts or expands under differing conditions of flow and

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

they show the marked effect that turbulence of flow may have upon the amount of head lost, and they also have a direct bearing upon problems in hydraulic practice that involve the contraction and expansion of a stream in flowing through passages. Comparatively little experimental work has been done hitherto to determine the value of conical mouthpieces of various angles and lengths in reducing the lost head at the entrance to and discharge from a submerged pipe, particularly for mouthpieces of the sizes and proportions comparable with those met in engineering practice. The need for such experiments was apparent. The minimizing of the lost head due to the contraction and expansion of a stream may be of considerable importance in many hydraulic problems; for example, the intake of a pipe, particularly when the pipe is of short length and of large diameter, the suction and discharge-pipes of a low-head pump, the reduction or expansion from one pipe to another of different diameter or of different shape, the passages through a large valve, the passages through locomotive water-columns, the draft-tube to a turbine, the connection from a centrifugal pump to a main, the sluice-ways through dams, the slat-screens at head-gates, culverts, and short tunnels, jet-pumps, the Boyden diffuser as formerly used for the outward-flow turbine, the Venturi meter, the suction and discharge pipes of dredges, and the guide vanes and runner of a turbine. Losses due to this cause are difficult to estimate and easy to overlook. Even where such losses are in themselves of little consequence as compared with other quantities involved, they may have an important influence upon subsequent losses on account of the turbulent motion started by the contraction or expansion. The efficiency of a drainage-pump or other low-head pump, for example, may be increased by an entrance-mouthpiece on the suction-pipe because it allows the pump to receive the water in a smoother condition of flow. It is well known that a turbine must receive the water from the guide-vanes without shock if, in the subsequent flow through the runner, the energy of the water is to be absorbed efficiently by the turbine. The loss of head through a Venturi meter may be considerably increased if the meter is placed too short a distance downstream from a valve, elbow, or other obstruction or cause of disturbance in the pipe. The friction-factor for a pipe following an obstruction or bend may be changed by the disturbance thus caused; the lost head at the entrance to a pipe, particularly when projecting inward, may be more than that ordinarily assumed for a tube three diameters long. There is but little definite knowledge on the subject of the effect of abnormal conditions, and it offers a large scope for investigation. The fact that a comparatively small change in the form of the blades of a turbine-runner may result in a large effect on the efficiency of the turbine should prove suggestive when estimating the probable effect of turbulent flow in less severe or critical cases. It is also worth mentioning in this connection that the recent advances in turbine design have been due largely to the attention given to the approach-channels to the guide-vanes and to the design of the draft-tube.

The flow of water usual in engineering practice is rather turbulent. The general equation of energy, or Bernoulli's theorem, so generally used in hydraulics, applies only when the particles of water move with uniform velocity in parallel stream-lines. Although this condition of flow seldom occurs, satisfactory analyses may often be made by using an average velocity and introducing empirical constants. A very slight change in the conditions under which flow takes place may cause a large difference in the behavior of the water. There is always danger in extending the use of experimental data or empirical constants to apply to conditions of flow different from those under which the data were obtained.

CONCRETE FORDS FOR CROSSING INTERMITTENT STREAMS

The construction of concrete-paved fords in place of bridges across shallow intermittent streams with sandy bottoms is discussed in an article in a recent number of 'Portland Cement.' Where the bed of the stream is considerably lower than the banks, or where the normal flow of the stream is considerable, such fords are not recommended.

In constructing a ford, 2 by 6-in. timbers should be used for side-forms and drag-guides. The top of the form should be placed at the average elevation of the sandy bed of the stream. The sand between the forms is then removed to a depth of 6 in. A trench is excavated just inside the forms so as to provide a mold for a concrete baffle-wall. The trench is made deeper on the down-stream than on the up-stream side, since the former is more subject to wash. The baffle-walls are also carried across the ends of the ford. The ford should be made level at the bottom, and inclined, where necessary, at each end. The concrete is then placed. Triangular mesh or else $\frac{3}{8}$-in. twisted bars may be used for reinforcement. When required, some sort of apron-construction can be used. If the stream is not entirely dry under ordinary conditions, a concrete box-culvert can be combined with the ford. A plain concrete ford 16 ft. wide can be built for $2.50 to $3 per lineal foot.

Arc-welding has been used experimentally for depositing new metal on worn flanges of steel car-wheels. The electrode employed was of $\frac{1}{4}$ in. diam. cold-rolled steel. The cost of removing, welding, finishing, and replacing a wheel amounted to approximately the same as the cost of machinery, while the value of the metal that would be wasted in turning is saved. Moreover, if turned, at least $\frac{5}{8}$ in. of metal would have to be removed from the tread, reducing the life of the wheel by one-third. Wheels with welded flanges have run 40,000 miles, which might be increased by using carbon electrodes and chilling the metal. The process has also been employed for restoring flat spots on wheels by depositing new metal and grinding to a true contour.—'Mechanical World.'

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

FALLACIES IN INVESTIGATION OF WATER SUPPLIES*

By H. A. WHITTAKER

For many years laboratory workers have been developing analytical methods for the detection of pollution in water. These investigations have resulted in the establishment of standard methods for this purpose. These methods, when properly applied, form an important part of a water-supply investigation. A field survey is also essential before the safety of a supply for drinking purposes can be determined. Unfortunately, some health departments depend mainly on an analysis of the water, without obtaining first-hand information regarding the environment and the structural and operative features of the water supply. The field work is often left to untrained individuals in the local communities, who collect the field data and water samples. By this method, the field survey, which is one of the most essential parts of the investigation, is placed in the hands of an untrained and frequently incompetent observer. The water samples are then shipped to the laboratory and examined by skilled chemists and bacteriologists. This method compels the skilled worker to rely on the information furnished by an untrained person regarding the fundamental features of the investigation.

This practice is often the result of a desire on the part of health departments to extend their services to the public, without considering the dangers associated with this method. Frequently these departments are short of funds to carry on field surveys, and this method is provided as a substitute for more thorough work. After the public has become accustomed to such procedure, it is difficult to refuse to examine samples collected by anyone and from every conceivable source.

In 1903 the Minnesota State Board of Health recognized the fallacy of attempting to investigate water supplies by this method. Since that time it has required that the field and laboratory work for these investigations be done by trained representatives of the board. The 569 investigations undertaken represent both surface and underground water-supplies from a variety of sources, including wells, springs, lakes, and rivers. The need for water-supply investigations is shown by the fact that 344, or 60% of the samples examined, were found to be unsatisfactory. Of the unsatisfactory supplies, 180, or 52%, were shown to be unsafe by both the field survey and the analytical results; 136, or 40%, by the field investigation alone, although the analytical results were satisfactory; and 28, or 8%, by the analytical results alone, although the field investigation did not show the possibilities of pollution at that time.

This shows the importance of thorough field-work, for had the analytical results been accepted as the only index, 40% of the unsatisfactory supplies would have been approved. It is also true that had the analytical work been omitted, 8% of the unsatisfactory supplies would have been overlooked. Both field and analytical investigations should be made before an opinion is given as to the safety of a water supply. The field survey should give an accurate idea of the possibilities of present and future pollution, while the analyses should show the sanitary condition of the water at the time the investigation is made, and may also furnish information about the past history of the water. The field survey and analyses together should afford a basis for recommendations for the protection or abandonment of the supply.

Any method in the investigation of water supplies that provides for the collection of haphazard information by untrained individuals is objectionable. There is a lack of uniformity in the procedure for investigating the safety of water supplies. A comprehensive survey of the methods of all State departments, at least, would be desirable. Although a variety of conditions attend the work of public health departments in different sections of the country, a standard procedure could be outlined toward which all could work.

*Abstract from 'American Journal of Public Health.'

HYDRAULIC JACKS

Hydraulic jacks sometimes fail to develop full capacity, or else settle slowly when left standing under a load. Such failures are usually the result of defective packing. These defects show themselves first in the failure of the jack to raise or hold the load. When this is noted the jack should be examined to find out where the packing failed to hold. The leakage at the defective point is readily detected.

A well-known manufacturer of jacks makes these recommendations with regard to the valves and their seats: If the packing is in good order and the ram does not rise when pumping, the suction-valves are not working properly. If the lever rises when the hand is removed, the pressure-valve is not working properly. If the valves or their seats become worn or scratched, grind them to a fit with oil and a little flour of emery. Do not grind them too much, and wash the valves and their seats perfectly free from emery before putting the jack into service again. If the valves are deeply scored or have become too much worn, replace them with new ones.—'Mechanical World.'

Diagonal roads in place of roads following section-lines are advocated by W. S. Gearhart, state highway engineer of Kansas, in an article in 'The Kansas Farmer.' A road 60 ft. wide on two sides of a section of land occupies 14.55 acres, while a road of the same width diagonally across the section requires only 10.28 acres, a saving of 4.27 acres of land, and 0.586 mile in distance. This saving in acreage is an important item in the cost of right-of-way, and the saving in distance means a saving both in time and in the cost of grading and other improvement.

Generated on 2024-09-30 01:36 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Industrial Progress

DIAMOND-DRILL TEST BORINGS

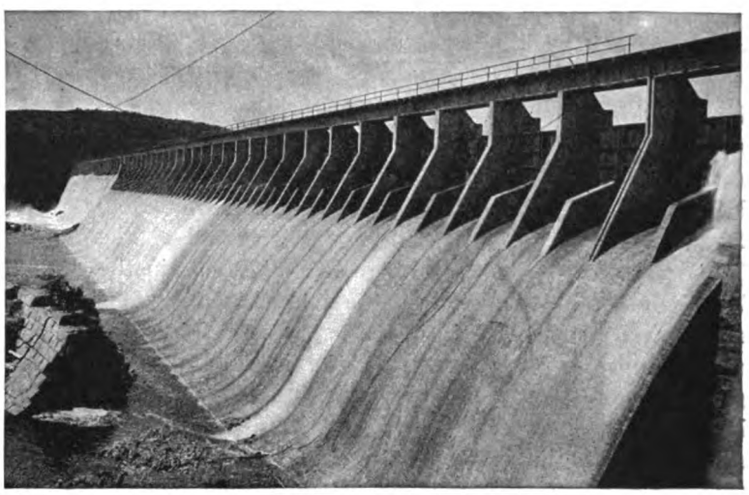
By J. A. WENTZ

At the site of the Great Arrow rock dam, completed about three years ago by the U. S. Reclamation Service, eight miles above Boise City, Idaho, on the Boise river, an entire year was occupied in making test-borings with the Sullivan diamond core-drill, to find a suitable location for the foundation of the dam. Sixty holes were put down to various depths. In 1913 the Little River Power Co. proposed building a modern dam of large proportions across the Little river at Lookout mountain in Alabama. In order that no uncertainty might exist regarding the solidity of the foundation, five diamond-drills were ordered and furnished by the contract drilling department of the Sullivan Machinery Co., of Chicago, and 75 holes were put down, ranging from 100 to 550 ft. deep, at an approximate cost of $25,000. In 1910, the Portland Railway, Light & Power Co., of Portland, Oregon, had in mind the construction of two large dams on the Clackamas river. The first step taken was to employ diamond core-drills in the selection of sites at which the foundation rock would be sufficiently solid to carry the structure; also at which the least excavation would be required. With the knowledge gained by this drilling, it was possible to carry on the construction to much better advantage and at a lower cost than if the rock conditions had not been developed by this method.

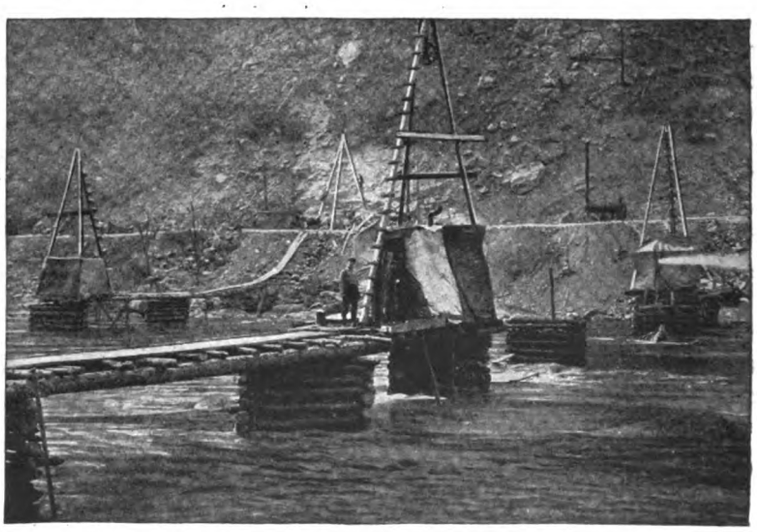
The Chicago & Northwestern Railway owns a Sullivan diamond core-drill, which is used from time to time by the bridge engineering department in selecting suitable locations for bridge-piers. The location for the bridge across the Missouri river at Pierre, South Dakota, was selected in this manner, the test-boring being done during the winter when the drill-shanty could be set up on the ice. The Sullivan diamond-drill was used again in making test-borings at Clinton, Iowa, for the Northwestern bridge across the Mississippi river. Well-drills had previously been used at this site and a profile of the river-bottom drawn up to show the line of solid rock indicated by the borings. Verification of this work with the diamond-drill showed that the well-borings were inaccurate, as they had indicated solid rock at points where the rock was in reality only a projecting shelf. The actual line of solid rock was found to be considerably lower as a result of the core-borings taken with the diamond-drill.

Many other instances could be mentioned to show that modern engineers refuse to take chances or trust to luck in construction work of this type. Numerous cases are on record in which, as a result of insufficient investigation, dams have been built on what appeared to be solid rock, but which events proved to be only thin layers of stratified material with softer beds below. When the full pressure of the water storage was exerted the dam has given way and been carried down the stream. The city of Austin, Texas, had an experience of this kind a few years ago. The foundation of the dam, constructed for a water-supply, gave way, and the structure was swept away and broken up. In 1907, test-borings by the Sullivan Machinery Co., under the direction of the engineer, Walter G. Fitzpatrick, showed that the dam had been built on a thin bed of limestone, under which was soft shale, badly faulted. After the old dam had been in use for some time, the undermining action of the water advanced to a point at which the entire structure was ruined. On the Missouri river near Helena, Montana, the Hauser Lake dam, a structure of the hollow-steel pattern, failed from similar causes, as was demonstrated by the diamond-drill, which was extensively used after the failure took place and by means of which a safer location was selected upon which a dam of approved permanence has been erected.

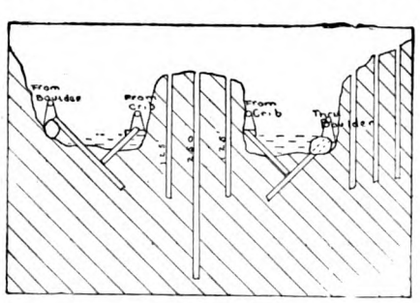
In comparison with the terrible damage and the enormous losses that may be caused by the failure of a dam or bridge due to unsafe foundations, the amount of money required for adequate exploration before the structure is begun is insignificant.



DAM ON THE COLORADO RIVER. FRAGMENT OF OLD DAM ON LEFT



SULLIVAN DIAMOND-DRILLS TESTING BED OF LITTLE TENNESSEE RIVER



DIAMOND-DRILL BORINGS FOR A DAM SITE, CLACKAMAS RIVER, OREGON

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

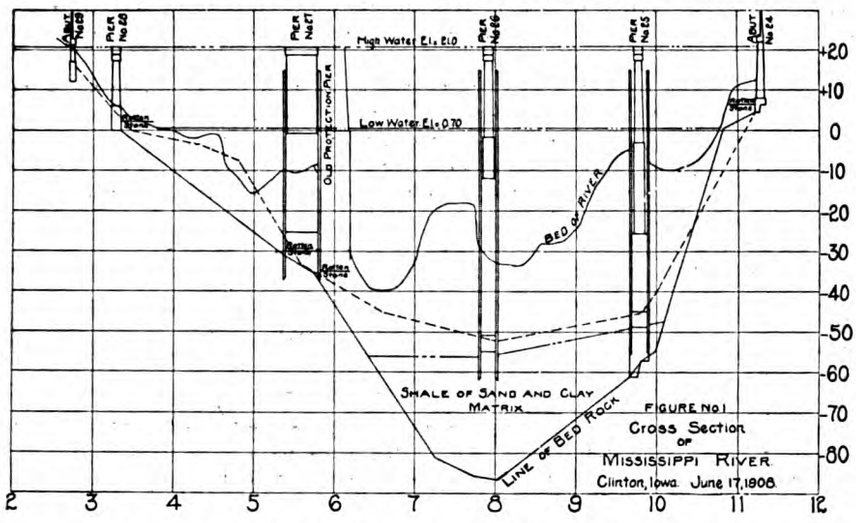


FIGURE No 1
Cross Section of Mississippi River
Clinton, Iowa. June 17, 1908.

TEST-BORING FOR CHICAGO & NORTHWESTERN BRIDGE, CLINTON, IOWA

The dotted line shows supposed bedrock, as disclosed by borings made with a churn-drill. The solid line is real bedrock, proved by the Sullivan diamond-drill.

THE BRINELL METER

The construction of the portable 'Brinell Meter', a patented invention of F. H. Schoenfuss, Director of the Metallurgical Laboratory, Standard Roller Bearing Co., is based on the principle of action and reaction.

A steel ball of 10 mm. diameter is placed between two surfaces of metal, one of known Brinell hardness, and the other of unknown hardness, being the material under investigation. Any pressure exerted against the assemblage of the three presses the ball with the same force into the surface of the plate of known hardness as into the plate of unknown hardness, and the size of the indentations obtained are in direct proportion to the Brinell hardness of the two metals.

Direct-reading tables are furnished with the outfit showing 'Brinell Hardness Units' for the material under test, depending on the ratio of the indentations produced (by means of a hammer blow); measuring scales for determining the diameter of the dents also form a part of the equipment.

The Brinell test for determining the hardness of metal has been officially accepted as the standard method by the American Society for Testing Materials, the Society of Automobile Engineers, and is used and recommended by the U. S. Bureau of Standards.

The cost of Brinell tests has been considerably reduced through the development of the portable Brinell meter. While formerly it was necessary to cut and prepare a specimen for test in the Brinell machine, an operation quite expensive in time and labor, it is now possible to eliminate the loss of time and to make 100 Brinell tests against every hardness standard as furnished with the Brinell meter. These standard bars are six inches long and have four surfaces to work on. Six of these bars are supplied with the standard outfit, and additional bars are furnished at 50c. each, within the range from 150 to 700 Brinell, and at 75c. each, within the range from 40 to 150 Brinell. Thus, the cost of every Brinell test is now reduced to a fraction of a cent, and considerable saving in time is afforded.

If metal is purchased under specification of a certain hardness, the standard bars for use in the instrument can be supplied of that specified hardness. The deliveries can then be rapidly checked, as the dents in the material tested and in the standard must be of exactly the same size, if the metal comes up to specifications.

The Brinell hardness of metals and alloys is in direct relation to their tensile strength, so that the portable Brinell meter can also be used as portable tensile-strength tester.

The relation between Brinell hardness and tensile strength is a direct one, but the 'constant' is different for the various metals and alloys. It has been accurately determined for strait carbon steel (up to 1% carbon), so that the constants published below are of considerable value in determining the tensile strength of structural steel, for instance:

A. For hardness numbers below No. 175 Brinell.

Constant = 514.87 for indentations transversal to rolling direction.

Constant = 503.49 for indentations in the rolling direction.

B. For hardness numbers above No. 175 Brinell.

Constant = 489.27 for indentations transversal to rolling direction.

Constant = 460.82 for indentations in the rolling direction.

Example: Brinell hardness determined on steel beam transversal to rolling direction = No. 185. Tensile = $185 \times 488.27 = 90{,}515$ pounds.

This makes the Brinell meter a handy, portable, tensile-strength tester, especially valuable to mechanical and structural engineers, permitting rapid tensile strength determinations on vertical and horizontal steel structures.

The following are the advantages of the portable Brinell meter:

It permits the accurate and convenient determination of the Brinell hardness of metals and metal products, independent of their dimensions, shape, and location. Accurate Brinell hardness tests can be made by means of this instrument at any chosen spot of a large mass of metal, such as a casting, rail, ingot, car-wheel, steel beam, metal tube, armor plate, shell, or gun barrel. No cutting of specimens is required. Whenever specimens of material are tested, it is very uncertain whether they represent the true average hardness value of the entire mass of metal under test. The Brinell meter eliminates the sampling error, as it permits accurate Brinell tests at any chosen spot; a series of Brinell tests on a large piece of metal can thus be quickly made and the average hardness and uniformity of the material may be ascertained. The Brinell determinations carried out by means of the portable Brinell meter are equally accurate in tests in horizontal and vertical position, of thick and thin metal sections, of hard and soft metals. The Brinell meter is portable. Total carrying weight of complete outfit, 6½ lb. Dimensions of carrying case, 9 by 6 inches.

Although the portable Brinell meter does more than the old-style Brinell testing machines, its price is $55 only, so that the most accurate method of hardness determination is brought within the reach of the smallest shop.

TONS OF STONE BROKEN PER POUND OF EXPLOSIVE

The following records of blasts made in different parts of the country may be taken as typical of modern practice. It will be seen that the average is from four to six tons of stone broken per pound of explosive when blasting with deep bore-holes, such as those made with the churn-drill.

A blast in a limestone quarry in Tennessee, where the stone was being produced for ballast, consisted of 16 bore-holes, 5⅝ in. diam. each, with an average depth of 75 ft. The holes were spaced 18 ft. apart, having an average face-burden of 22 ft.,

Generated on 2024-09-30 01:36 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

and 3750 lb. of 60% and 3700 lb. of 40% low-freezing dynamite were used in the blast, producing 5.7 tons per pound of explosive. A little higher result is noted in a blast at a cement-rock quarry in Pennsylvania, where 14 bore-holes, 5¾ in. diam., and 86 ft. deep on an average, placed 18 ft. apart, with a face-burden of 30 ft., were charged with 4850 lb. of 60% and 3250 lb. of 40% dynamite, and yielded 55,000 tons of broken rock, or 6.8 tons per pound of explosive. At a Kentucky limestone quarry, producing stone for ballast, a blast of 9 bore-holes 50 ft. deep, spaced 18 ft. apart, and 25 ft. back from the edge of the bench, loaded with 3250 lb. of 40% dynamite, produced 16,200 tons, or 5 tons of rock per pound of explosive. Again, in an Oklahoma quarry, where the stone was to be used for railroad ballast, 8 bore-holes 95 ft. deep, with an average space between holes of 28 ft., and an average face-burden of 38 ft., were charged with 2200 lb. blasting gelatine, 3350 lb. of 60%, and 1250 lb. of 40% dynamite. A total of 6800 lb. of powder in this case produced 62,000 tons, or 9 tons per pound of explosive. Moreover, this blast was badly balanced, necessitating the use of very strong explosive at the bottom, and the cost per ton was just as high or higher than a balanced blast.

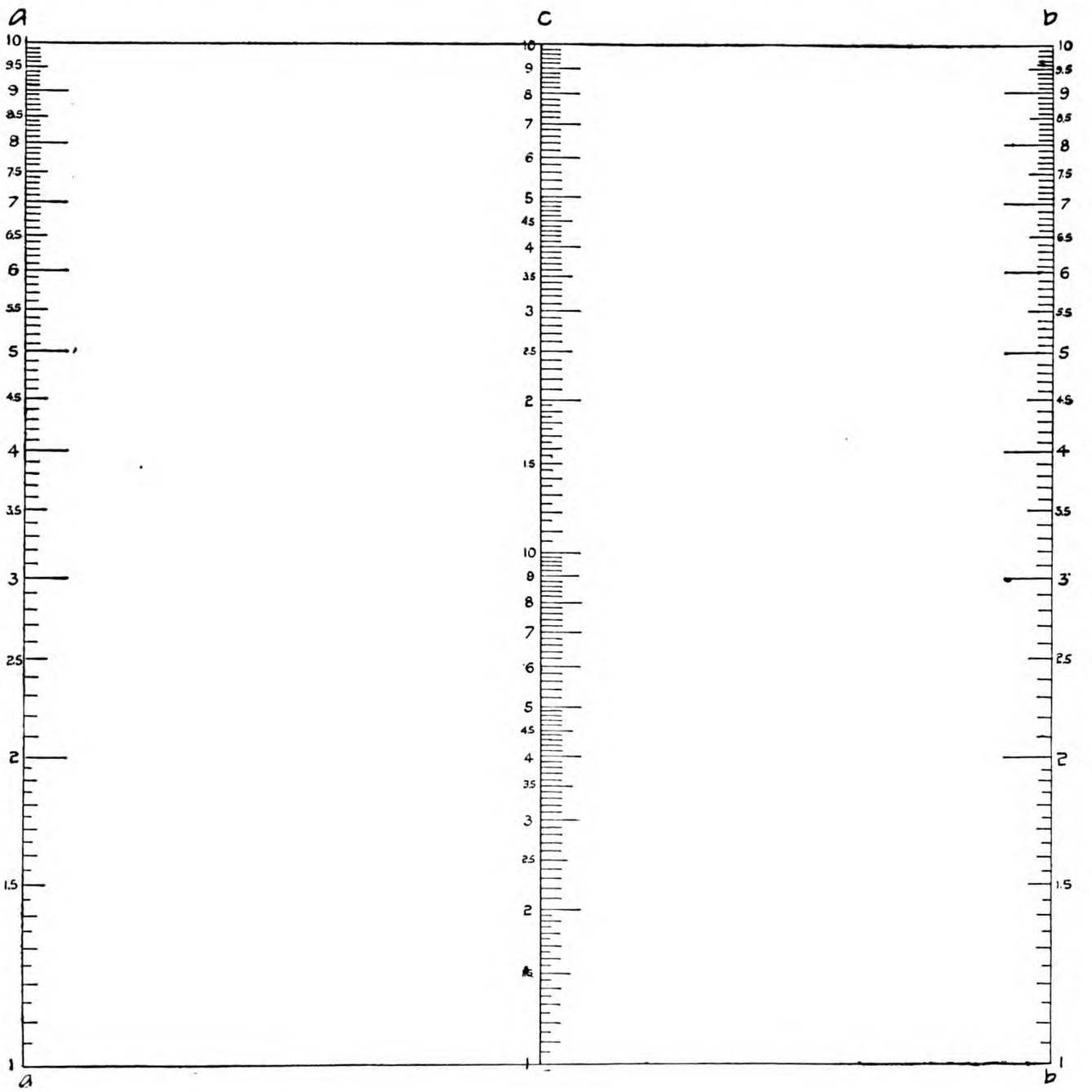
Another example is that of an iron ore where 26 holes, 5¾ in. diam., averaging 84 ft. deep, spaced 15 by 15 ft. apart, with the holes triple-loaded and fired with cordeau and one electric blasting cap, charged with 8500 lb. 40% dynamite, produced 50,000 tons of ore, or 5 tons per pound of explosive.

Engineers' Note Book

MULTIPLICATION CHART

By H. DEVEREUX

The accompanying chart may be used like a slide-rule for multiplying. Lay a straight-edge from multiplicand on scale 'a' to multiplier on scale 'b' and read product on scale 'c'.



Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Engineering Societies

IDAHO SOCIETY OF ENGINEERS. Ira F. Schaffner, secretary, Boise.

Los Angeles Section of AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Ford W. Harris, secretary, 1029 Higgins building.

Los Angeles Section of AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Edward Woodbury, secretary, 255 East 3rd street.

OREGON SOCIETY OF ENGINEERS. Orrin E. Stanley, secretary, room 409, City Hall, Portland.

Portland Section, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Paul Lebenbaum, secretary, 45 Union Depot.

Portland Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. J. A. Currey, secretary, 194 North 13th street, Portland.

San Francisco Section of AMERICAN SOCIETY OF CIVIL ENGINEERS. N. A. Bowers, secretary, Rialto building.

San Francisco Section of AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Carl F. Braun, secretary, Hooker & Lent building.

San Francisco Section of AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. A. G. Jones, 811 Rialto building.

Southern California Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. Wilkie Woodard, secretary, 435 Consolidated Realty building, Los Angeles.

UTAH SOCIETY OF ENGINEERS. Hugh C. Lewis, secretary, Capitol building, Salt Lake City, Utah.

The annual meeting of the WASHINGTON IRRIGATION INSTITUTE was held at North Yakima, Washington, December 4 and 5. The following officers were elected for the coming year: president, E. M. Chandler; first vice-president, E. F. Benson; second vice-president, W. N. Granger; directors, O. M. Waller and H. M. Gilbert.

At the annual meeting of the SAN DIEGO ASSOCIATION OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS. N. B. Kellogg was elected president, George Cromwell vice-president, and J. R. Comby secretary-treasurer.

The regular bi-monthly meeting of the SAN FRANCISCO ASSOCIATION OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS was held December 18. Jerome Newman was elected president for the coming year, W. C. Hammatt vice-president, and N. A. Bowers secretary-treasurer. In place of the usual set paper there was an informal discussion on the subject of 'Why Engineers Have Not Achieved a Higher Rank Among the Professions.'

Personal

ROBERT A. CRAIG has been appointed city manager of Santa Barbara.

W. H. GEORGE, who underwent a mastoid operation recently, is recovering.

ROBERT M. HENNINGSEN has been appointed harbor engineer of Oakland, California.

JAMES ALLEN has been re-appointed State highway commissioner for Washington.

JOHN F. RICHARDSON has been appointed project manager for the U. S. Reclamation Service, with headquarters at Fallon, Nevada.

JOHN S. BATES has been appointed city engineer of Selma, California, succeeding W. H. SHAFER, who resigned because of the pressure of other duties.

D. W. PONTIUS, formerly traffic manager for the Pacific Electric Railway, has been appointed general manager for the San Diego & Arizona Railway.

I. V. AUGUR has been appointed deputy State oil and gas supervisor for district No. 2, comprising Ventura county. Mr. Augur will have his headquarters at Santa Paula.

GEORGE A. ARMES, formerly engineer for the Union Iron Works has been appointed assistant district officer of the western division of the United States Shipping Board.

JOHN B. YEON, the Portland capitalist that has served without salary as roadmaster of Multnomah county, Oregon, for the past four years, has consented to continue in office.

J. J. JESSUP, formerly city engineer of Berkeley, California, has resigned to enter private practice. He has been succeeded by C. C. KENNEDY, who has been assistant city engineer.

M. C. FRENCH, formerly superintendent for P. B. Cross, contractor of Willows, California, has been commissioned as major in the Engineer Corps, and has been assigned to Camp Lee, Virginia.

ARTHUR B. SMITH, formerly district engineer for the Los Angeles County road department, has been commissioned as lieutenant in the Engineer Corps, and has been assigned to Camp Lee, Petersburg, Virginia.

CHARLES O. ROSKELLEY has been appointed city manager of Brigham City, Utah. Mr. Roskelley is a civil engineer and has been a member of the city council. This is the first time that Brigham City has had a city manager.

L. P. ST. CLAIR, G. M. SWINDELL, and W. F. BYRNE compose the new Federal Oil Inspection Board of California, appointed by VERNER Z. REED, of the Federal Mediation Commission, to settle future difficulties between Californian oil operators and oil workers.

Commercial Paragraphs

The STANDARD OIL CO. has published for distribution to paving contractors, highway and city engineers, road builders, or others who may be interested, bulletin No. 8, on the use of Calol asphaltum in pavement construction. It may be obtained by applying at any Standard Oil Co. station or office. The bulletin states briefly, without discussion, the principles of road construction, and deals with the mixing-methods employed in making asphaltic pavements. The design of mixing-plants is shown, drawings being used to illustrate the details. There is also a pictorial representation of the building of an asphaltic concrete pavement. Specifications are given for asphaltum suitable for paving by the mixing-method. The appendix gives the various standard tests on rock, sand, and asphaltum. An index is provided.

Wallace T. Roberts, formerly sales engineer for the SULLIVAN MACHINERY CO. in southern Michigan, northern Ohio, and northern Indiana has been appointed district manager for the company with headquarters at Denver. Mr. Roberts succeeds Captain Matt R. Blish, Ordnance Department, U. S. A., acting manager at Denver since last May, who in turn succeeded Captain G. W. Blackinton, now commanding the third battalion, 353rd infantry regiment, National Army.

The STANDARD OIL CO. has presented to the University of California a collection of models, maps, and specimens to be used by the college of mining in the course in petroleum engineering. Most of the collection was exhibited by the company at the Panama-Pacific Exposition.

BAKER & HAMILTON and the PACIFIC HARDWARE & STEEL CO. have consolidated. Alexander Hamilton is president of the combined corporations and W. T. Smith, formerly president of the Pacific Hardware & Steel Co., chairman of the board of directors.

The Municipal Engineering & Contracting Co. and the F. C. Austin Drainage Excavator Co. have been consolidated under the name of the F. C. AUSTIN CO., INC.

The SULLIVAN MACHINERY CO. has moved its Salt Lake office from the Kearns Bdg. to 1606 Walker Bank Bdg., the change being made December 12.

Generated on 2024-09-30 01:35 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Construction News Summary

STREET AND ROAD WORK

ASTORIA, ORE.—Bids for improvement of Irving avenue have been rejected because too high, and work will be postponed indefinitely.

AUBURN, CAL.—City council has passed resolution of intention to pave the main street from curb to curb. A 16-ft. strip is now being paved.

BAKERSFIELD, CAL.—Contract for rolling and tamping Sumner street has been awarded to F. W. Nighbert, Bakersfield, for 2.9c. per square foot.

CALEXICO, CAL.—G. R. Daley, McNeece Bdg., San Diego, was low bidder and was awarded contract for improving streets at the following unit prices: concrete curbs, 46c. per ft.; concrete sidewalks, 20c. per sq. ft.; 2-in. bitulithic pavement on 5-in. concrete base, 27.8c. per sq. ft.; 1½-in. warrenite pavement on 4-in. concrete base, 24.3c. per sq. ft.; a total of $174,322.24. Federal Construction Co. bid $186,427.82 and Bryant & Austin, $188,855.23.

COLUSA, CAL.—Contract for re-surfacing the south span of the Colusa draw-bridge with mastic pavement has been awarded to Mallott & Peterson, Monadnock Bdg., San Francisco.

DALY CITY, CAL.—Contract for grading and construction of asphaltic concrete pavement, concrete sidewalks and gutters, and vitrified-pipe sewers on several streets has been awarded to H. Crummey Co., Inc., Hearst Bdg., San Francisco, for $19,820.50.

EUREKA, CAL.—Plans for grading Broadway between Fourth and Clark streets have been adopted, and call for bids will be issued soon.

FAIRFIELD, CAL.—Board of Supervisors has asked U. S. Office of Public Roads to send engineer to county to assist in planning highway system.

FRESNO, CAL.—Bids will be received until January 7 by W. H. Ryan, city clerk, for construction of concrete sidewalks on several streets.

C. M. Baker was the only bidder and was awarded contract at $9200 for improvement of road in Squaw valley.

No bids were received for improvement of road from Shaver to Big Creek.

LOS ANGELES, CAL.—Contract for improvement of Fountain avenue has been awarded to George R. Curtis, Los Angeles, for $42,469.

Contract for improvement of Cove avenue has been awarded to M. W. McCombs, 1654 West 36th street, Los Angeles, for $2649. Johnston & Grohs bid $3487.14 and M. S. Cummings, $4549.23.

Contract for improvement of part of Lemoyne street has been awarded to M. S. Cummings, 1802 West 22nd street, Los Angeles, for $8478.01. Other bidders were: G. T. McLain, $9441.87; Johnston & Grohs, $9709.67; E. Schelling, $10,143.80.

Contract for improvement of part of First street has been awarded to W. R. Hefley for $14,274. Other bidders were: Fairchild-Gilmore-Wilton Co., $15,140.54; Johnston & Grohs, $16,250.80; E. Schelling, $17,475; Conrad Scheerer, $20,425.40; M. S. Cummings, $21,957.

Contract for grading and oiling part of Third street has been awarded to William Liddington, 420 East 60th street, Los Angeles, for $1927.76.

Contract for improvement of 29th street has been awarded to Fairchild-Gilmore-Wilton Co., Pacific Electric Bdg., Los Angeles, for $9369.32.

Contract for grading and oiling Eagle street has been awarded to W. R. Hefley for $2179.93.

Contract for construction of 0.63 mile of concrete pavement on Cypress avenue has been awarded to Fred Hoffman, 111 East 12th street, Long Beach, for $5300.

Contract for improvement of New Hampshire avenue has been awarded to Fairchild-Gilmore-Wilton Co. for $31,315.17.

MADERA, CAL.—Contract for paving F street and part of Yosemite avenue has been awarded to H. Crummey, Inc., Hearst Bdg., San Francisco, for $83,918.75. Other bidders were: Municipal Improvement Co., $85,378; California Road & Street Improvement Co., $86,257; Thompson Bros., $88,203; Worswick Construction Co., $88,459.

MARTINEZ, CAL.—Bids will be received until January 7 by C. E. Daley, city clerk, for construction of concrete sidewalks on several streets.

MILL VALLEY, CAL.—Clark & Henery Construction Co. bid $116,000 for paving streets in Tamalpais Park district. Engineer's estimate was $70,000. Bid was rejected and work has been postponed.

MODESTO, CAL.—D. C. Hartley was the only bidder and was awarded the contract for $0.175 per sq. ft. for paving several street-intersections.

MT. VERNON, WASH.—Bids will be received until January 8 by Will R. Arges, county auditor, for construction of 3½ miles of concrete pavement on highway from Olympic Marsh to Riverside.

NAPA, CAL.—W. J. Schmidt, who was awarded contract for construction of four miles of concrete pavement near Greenwood hill, has been allowed to abandon the work. The road will probably be finished by day-labor.

OAKLAND, CAL.—City council has passed resolution of intention to pave and to construct sewers on 7th street from Bay street west to Albers Bros. Milling Co. mill. Call for bids will be issued soon. Estimated cost is $80,000.

Contract for improvement of Tallant street has been awarded to Hutchinson Co., Oakland, at 1.5c. per sq. ft. for grading, 48c. per ft. for concrete curbs, 15c. per sq. ft. for concrete gutters, and 9.6c. per sq. ft. for oil-macadam pavement.

OLYMPIA, WASH.—Contract for construction of 5¼ miles of the Pacific highway between Woodland and Martins Bluff has been awarded by State Highway Commission to L. H. Goerig, Seattle, for $80,007. Other bidders were: Rojette, Hobard & Winters, Spokane, $89,098; Allred & James, Centralia, $105,518; Nettleton, Bruce & Eschbach, Seattle, $106,507; E. T. Johnson, Portland, $110,666. Engineer's estimate was $82,904.

Contract for construction of 10 miles of the Sunset highway between Vantage Ferry and Burke has been awarded by State Highway Commission to Quigg Construction Co., Wenatchee, for $68,690.30.

Contract for grading and draining 30.6 miles of Central Washington highway between Pasco and Connell has been awarded to A. L. Mitchell and C. M. Payne, Spokane, for $52,984.50. Engineer's estimate was $54,238. Zane & Conley, Pasco, were the only other bidders at $62,131.80.

OREGON CITY, ORE.—Special taxes for highway construction amounting to $100,000 have been voted in various road districts in Clackama county.

OROVILLE, CAL.—Bids will be received until January 8 by C. F. Belding, county clerk, for construction of last unit of Oroville-Bangor road.

PASCO, WASH.—Bids will be received until January 7 by county auditor for construction of eight miles of highway near Pasco.

PHOENIX, ARIZ.—Contract for improvement of Third avenue and Westmoreland avenue has been awarded to Southwestern Contracting Company

PORTERVILLE, CAL.—Plans for paving several streets have been postponed on account of the high cost of materials.

PORTLAND, ORE.—State Highway Commission has awarded contract for grading 11 miles of Pacific highway between Dillard and Myrtle creek to Calvert & Wolke, Grants Pass, for $127,520. Engineer's estimate was $143,000.

United Contracting Co. was low bidder at $25,596 for grading and construction of bridges on 1½ miles of highway near Prineville. Bid will probably be rejected as the engineer's estimate was $13,000.

Bids will be received until January 8 by State Highway Commission for construction of Columbia River highway from Hood River to Mosier, 5.8 miles, requiring 195,000 cu. yd. of excavation, 150,000 cu. yd. of which is solid rock.

REDWOOD CITY, CAL.—Supervisor John MacBain will have charge of construction of gravel shoulders on Santa Cruz avenue at Camp Fremont. Estimated cost is $7600.

RICHMOND, CAL.—Bids will be received until January 14 by A. C. Faris, city clerk, for paving four blocks on 15th street.

Following bids were received for placing bitulithic surface on the concrete pavement on Standard avenue: Municipal Improvement Co., $4951.72; H. Crummey, Inc., $5184.35; Worswick Street Paving Co., $5317.28. All bids were rejected because too high. A paint-coat surface will be placed on the pavement.

Following bids were received for paving Beck street: Fred Meyer, $2749; L. L. Page, $3352.50; S. C. Rogers, $3846.56. All bids were rejected because Meyer's bid was irregular.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Following new bids were received for construction of macadam pavement on Beck street: Fred Meyer, $2713.53; S. C. Rogers, $3230.19.

No bids were received for paving part of Santa Fe avenue.

RITZVILLE, WASH.—Bids will be received until January 12 by L. Schrag, county clerk, for construction of permanent highway No. 4.

SACRAMENTO, CAL.—Bids will be received until January 7 by State Highway Commission for grading 3.7 miles of highway in San Diego county near Sweetwater river requiring 55,250 cu. yd. excavation, 1352 ft. of 18-in. corrugated pipe, 644 ft. of 24-in. pipe, 138 ft. of 30-in. pipe, 135 cu. yd. concrete in culverts and monuments, 160 cu. yd. dry-rubble masonry, 500 ft. guard-rail, and 180 monuments. State will furnish pipe-railing for culverts, reinforcing-steel, corrugated pipe, and cement.

Erickson & Peterson, San Francisco, were low bidders and were awarded contract for construction of 8 miles of state highway in Mendocino county between Willits and Arnold at the following unit prices: excavation, $0.74 per cu. yd.; 12-in. pipe, $0.60 per ft.; 18-in. pipe, $0.70; 24-in. pipe, $1; concrete in culverts and monuments, $17 per cu. yd.; 4-in. drain-tile, $0.50 per ft.; moving and re-setting property-fences, $275 per mile; monuments, $1; a total of $112,931.20. Other bidders were: Bates & Borland, $113,199; A. J. Fairbanks, $119,945.60; F. Rolandi, $122,975; P. F. Reilly, $129,039; W. B. Arndt, $129,199. Engineers' estimate was $88,170.96. State will furnish pipe-railing, reinforcing-steel, corrugated pipe, and cement, valued at $7095.26.

George S. Benson & Sons, Los Angeles, were the only bidders for construction of 8 miles of highway in Monterey county between San Ardo and San Lucas at the following unit prices: excavation, $0.90 per cu. yd.; 12-in. pipe, $1 per ft.; 18-in. pipe, $1.10; 24-in. pipe, $1.20; concrete in culverts and monuments, $17.50 per cu. yd.; concrete in pavement, $5.10 per cu. yd.; riprap, $5 per ton; slope-paving, $8 per cu. yd.; guard-rail, $1 per ft.; monuments, $2; a total of $73,215.60. Engineers' estimate was $58,851.48. State will furnish pipe-railing, reinforcing-steel, corrugated pipe, cement, sand, and coarse aggregate, valued at $55,002. Bid was rejected because too high.

No bids were received for construction of highway between Biggs and Nelson.

Healy-Tibbitts Construction Co., Main and Market streets, San Francisco, was low bidder at $137,308.26 for construction of 13 miles of concrete highway on top of levee along bank of Sacramento river near Grand Island. Other bidders were: Tibbitts-Pacific Co., $137,878.44; R. C. Storrie & Co., $174,507.80; Palmer & McBryde, $194,377.50. Engineer's estimate was $110,000.

Construction of the 15-mile stretch of county highway between Sacramento and Freeport has been abandoned by the contractors, and work will be completed by day-labor under the direction of R. M. Morton, engineer for the County Highway Commission.

Bids will be received until January 21 by State Highway Commission for the following highway work: In Modoc county, between Adin summit and Canby, 11 miles, to be graded. In San Diego county, through East San Diego and La Mesa, 4 miles, to be paved with concrete.

George S. Benson & Sons, Los Angeles, were low bidders for construction of 11 miles of state highway in Monterey county near San Lucas at the following unit prices: excavation, $0.75 per cu. yd.; 12-in. corrugated pipe, $1 per ft.; 18-in. pipe, $1.10; 24-in. pipe, $1.20; concrete in culverts and monuments, $17.50 per cu. yd.; concrete in pavement, $5.30; guard-rail, $0.80 per ft.; monuments, $2 each; a total of $104,772.50. Bates & Borland bid $106,442.50, and Palmer & McBryde, $115,626.50. Engineers' estimate was $112,485.53. State will furnish pipe-railing, reinforcing-steel, corrugated pipe, cement, sand, and coarse aggregate, valued at $70,561.

SALEM, ORE.—Force-account contracts awarded to Warren Construction Co. for macadamizing 20.8 miles of Columbia River highway have been rescinded, and work will be completed by day-labor under direction of state highway engineer Herbert Nunn.

SALINAS, CAL.—Board of Supervisors has decided that this is not a favorable time to raise money either by bonds or direct taxes for the county's share of the cost of construction of the state highway lateral from Hanford to San Lucas by way of Coalinga. The other two counties interested, Fresno and Kings, have declared their readiness to pay their share of the cost.

SAN DIEGO, CAL.—Contract for construction of concrete pavement on road to quarantine station has been awarded to O. Nelson, 1470 E street, San Diego, for $2189.50.

Fairchild-Gilmore-Wilton Co., Pacific Electric Bdg., Los Angeles, was the only bidder at $14,614.21 for grading and paving parts of National avenue, 16th street, and 13th street.

Contract for construction of concrete pavement, curbs, and sidewalks on Utah street has been awarded to George R. Daley, McNeece Bdg., San Diego, for $24,707.66.

SAN FRANCISCO, CAL.—Owen McHugh, Russ Bdg., San Francisco, was low bidder at $14,974.15 for paving part of Embarcadero. Other bidders were: G. W. McGinn, $17,862.35; Fay Improvement Co., $17,887.06; H. Crummey Co., Inc., $18,285.80; J. G. Harney, $19,905.30; Federal Construction Co., $20,639.70.

Board of Public Works has awarded the following contracts for street improvements:

Sidewalks on Geary street between 25th and 26th avenue, 27th and 28th avenue, and 31st and 32nd avenue to S. F. Johnson, Pacific Bdg., San Francisco, for 12½c., 13c., and 13½c. per sq. ft., respectively.

Sidewalks on Geary street between 29th and 30th avenue to Frank O'Shea for 12½c. per square foot.

Improvement of Pope street between Morse and Brunswick to C. B. Eaton, 11th and Harrison streets, San Francisco, at the following unit prices: excavation, $1.05 per cu. yd.; asphalt pavement, $0.27 per sq. ft.; vitrified brick pavement, $0.43 per sq. ft.; concrete curbs, $0.75 per ft.; concrete sidewalks, $0.15 per sq. ft.; 12-in. sewer, $4 per ft.; wye-branches, $2 each; 6-in. sewer, $1 per ft.; 10-in. culverts, $1 per ft.; brick catch-basins, $90 each; brick manholes, $80 each.

Improvement of Sunnyside avenue between Acadia and Baden streets to Federal Construction Co., Sharon Bdg., San Francisco, at $0.80 per ft. for concrete curbs and $0.245 for asphalt pavement.

Improvement of Joost avenue between Foerster and Genesee streets and of Foerster street between Joost avenue and Mangels avenue to Federal Construction Co. for $0.90 per ft. for concrete curbs and $0.28 per sq. ft. for asphalt pavement.

Improvement of Missouri street near 20th street to D. J. Counihan at the following unit prices: excavation, $1.24 per cu. yd.; embankment, $0.20 per cu. yd.; 8-in. sewer, $3.50 per ft.; 18-in. pipe, $4.25 per ft.; wye-branches on 8-in. sewer, $1 each; brick manholes, $90 each.

Sidewalks on 19th avenue between Irving and Judah streets to S. F. Johnson at 14c. per square foot.

Improvement of parts of Crescent avenue to S. F. Johnson at the following unit prices: granite curbs, $1.75 per ft.; asphalt pavement on concrete base, $0.2975 per sq. ft.; concrete sidewalks, $0.16 per sq. ft.; brick catch-basins, $100 each; 10-in. vitrified-pipe culverts, $2 per foot.

Improvement of Danvers street opposite the termination of Falcon avenue to T. S. Hutton, Call Bdg., San Francisco, at the following unit prices: asphalt pavement on concrete base, $0.275 per sq. ft.; concrete sidewalks, $0.15 per sq. ft.; granite curbs, $1.50 per ft.; re-dressing and re-setting granite curbs, $0.80 per ft.; re-setting granite curbs, $0.10 per ft.; brick catch-basins, $99 each; 10-in. vitrified-pipe culverts, $1.10 per foot.

Improvement of 18th street between Third and Illinois to J. G. Harney, at the following unit prices: embankment, $0.95 per cu. yd.; asphalt pavement on concrete base, $0.22; concrete sidewalks, $0.12 per sq. ft.; granite curbs, $1.10 per foot.

Improvement of 19th street between Tennessee and Minnesota to Fay Improvement Co., Phelan Bdg., San Francisco, at the following unit prices: granite curbs, $1.48 per ft.; asphalt pavement on concrete base, $0.27 per square foot.

Improvement of Mississippi street between 19th and 20th to Fay Improvement Co. at the following unit prices: brick pavement, $0.419 per sq. ft.; asphalt pavement on concrete base, $0.234 per sq. ft.; re-setting granite curbs, $0.24 per ft.; new granite curbs, $1.18 per foot.

Improvement of Cabrillo street between 45th avenue and La Playa to J. G. Harney at the following unit prices: concrete sidewalks, $0.12 per sq. ft.; concrete curbs, $0.70 per ft.; brick catch-basins, $75 each; 10-in. vitrified-pipe culverts, $0.15 per ft.; basalt-block header on concrete foundation, blocks to be furnished by city, $0.10 per sq. ft.; asphalt pavement on concrete base, $0.21 per ft.; re-setting granite curbs, $0.20 per foot.

Construction of sidewalks on Clement street to S. F. Johnson for 12c. per square foot.

Construction of sidewalks on West Clay street to J. G. Harney, Pacific Bdg., San Francisco, for 12c. per square foot.

Improvement of Army street near Noe street to Flinn & Treacy, First National Bank Bdg., San Francisco, at the following unit prices: concrete curbs, $1 per ft.; asphalt pavement, $0.56 per square foot.

Improvement of Silliman street between Bowdoin and Princeton to Flinn & Treacy at $0.90 per ft. for concrete curbs and $0.26 per sq. ft. for asphalt pavement.

Generated on 2024-09-30 01:41 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Improvement of Excelsior avenue between Edinburgh and Vienna streets to Flinn & Treacy at $1.40 per ft. for granite curbs, $0.30 per sq. ft. for asphalt pavement, and $0.47 per sq. ft. for brick pavement.

Construction of Laidley street where affected by slide to J. P. Holland, 550 Third street, San Francisco, for $2750.

SAN LUIS OBISPO, CAL.—Mass meeting of voters has decided in favor of direct tax instead of bond issue to pay for county's share of cost of construction of Famoso-Paso Robles highway.

SANTA ANA, CAL.—Steele Finley was awarded contract at $2761.80 for construction of concrete pavement at Laguna Beach. Wells & Bressler bid $5895.

Contract for construction of topeka surface on pavement at Buena Park has been awarded to Los Angeles Paving Co., Los Angeles, at 6.5c. per sq. ft. Fairchild-Gilmore-Wilton Co. bid 6.7c. per square foot.

Contract for paving section 3 of the Santa Ana Canyon road, 2.8 miles, has been awarded to J. S. Miller, Santa Monica, for $13,915.

All bids for paving section 1 of this have been rejected.

Bids will be received until January 7 by E. L. Vegely, city clerk, for construction of oil-macadam pavement and concrete curbs and gutters on North Parton street, and asphalt concrete pavement on West Fourth street.

SOUTH PASADENA, CAL.—Contract for grading and construction of concrete pavement on Fremont avenue has been awarded to Montgomery & Ducey for $5040. Conrad Scheerer bid $7132.50.

STOCKTON, CAL.—County engineer F. E. Quail is preparing plans for improvement of seven miles of Clements-Ione road.

Contract for construction of highway near Tracy has been awarded to Cy Moreing & Sons, Stockton, for $13,260.

TULARE, CAL.—Bids will be received until January 10 by F. M. Eldridge, city clerk, for paving 2.3 miles of streets to connect with county and state highways. Improvement will consist of 4-in. concrete pavement 20 ft. wide, with 5-ft. earth shoulders. Work will require 3300 cu. yd. excavation and 3009 cu. yd. of 1:2:4 concrete. Plans from A. P. Bosworth, city engineer, upon deposit of $5. Plans are also on file at office of 'Western Engineering'.

VISALIA, CAL.—Bids will be received until January 8 by George R. Prestidge, county clerk, for construction of highway from Lemon Cove to Three Rivers.

WATERVILLE, WASH.—Plans are being prepared by R. F. Foster, county engineer, and contracts will be awarded in 1918 for the following work: Grading and graveling 4 miles of permanent highway No. 1-A. Estimated cost is $18,000. Construction of permanent highway No. 4-A. Estimated cost is $10,000. Grading and surfacing Sunset highway. Estimated cost is $165,000.

YREKA, CAL.—Albert Anderson Co., Yreka, was low bidder at $7069.90 for construction of Sanborn Hill road. Bid was rejected and new bids will be received until January 7 by W. J. Neilon, county clerk.

YUMA, ARIZ.—Contract for improvement of several streets has been awarded to O. & C. Construction Co., Yuma, the only bidder, at the following unit prices: grading and construction of 1½-in. bitulithic pavement on 4-in. bituminous concrete base, $2.335 per sq. yd.; concrete sidewalks, $0.18 per sq. ft.; concrete curbs, $0.58 per ft.; a total of $58,077.19.

SEWERS AND DRAINAGE

FRESNO, CAL.—Contract for construction of 6-in. sewers in Belmont addition has been awarded to E. W. Redman for $854.

Contract for construction of addition to septic tank at city sewer-farm has been awarded to Frederickson & Shannon, Cory Bdg., Fresno, for $22,112, using concrete. The same firm bid $25,600, using brick.

LONG BEACH, CAL.—Johnson-Shea Co., Riverside, was low bidder at $67,750 for construction of 61,000 ft. of small vitrified-pipe sewers on several streets. Other bidders were: B. Z. Wucetich, $68,864; Wattson & Wattson, $73,100; J. S. Ukropina, $75,657; B. F. Tomich, $77,000.

LOS ANGELES, CAL.—Contract for construction of drainage system in district No. 2, including the low land in the vicinity of West Adams street, has been awarded to Mlagenovich & Gillespie, 3929 Washington street, Los Angeles, at $130,282 for the underground drainage system and $12,700 for the surface drainage system, a total of $142,982. R. A. Wattson, the only other bidder, bid a total of $168,800.

Contract for construction of storm-drain on Ocean View avenue has been awarded to Johnston & Grohs, California Bdg., Los Angeles, for $3222.

MODESTO, CAL.—Plans are being prepared by F. C. Herrmann, consulting engineer Modesto irrigation district, Merchants Exchange Bdg., San Francisco, for construction of drainage system for 4500 acres of land west of Salida and 6400 acres south-west of Modesto.

OAKLAND, CAL.—Contract for construction of sewers on East 23rd street has been awarded to J. Catucci, Oakland, for $1.25 per ft. for 8-in. sewer, $17 each for lampholes, and $0.60 for wye-branches.

RIVERSIDE, CAL.—Contract for construction of sewer has been awarded to Johnson-Shea Co., Riverside, for $249.62. Shull-Tucker Co. bid $297.70.

SAN DIEGO, CAL.—Holland Construction Co., Granger Bdg., San Diego, has been awarded contract for construction of reinforced concrete storm-drain at Logan avenue and 16th street, for $24,470.05.

City engineer George Cromwell is preparing plans for storm-drain on Canyon street. Estimated cost is $25,000.

SAN FRANCISCO, CAL.—Contract for construction of sewer on Edinburgh street between France and Amazon avenues has been awarded to S. F. Johnson at the following unit prices: 8-in. sewer, $1.50 per ft.; 12-in. sewer, $1.60 per ft.; 6-in. sewer, $0.75; wye-branches on 12-in. pipe, $1.50 each; brick manholes, $80 each.

Contract for improvement of Paris street between Italy and Amazon avenues has been awarded to J. F. Dowling at the following unit prices: 8-in. sewer, $3.25 per ft.; wye-branches, $1.50 each; 6-in. sewer, $1 per ft.; brick manholes, $90 each.

Contract for construction of sewers on Detroit street has been awarded to S. F. Johnson, Pacific Bdg., San Francisco, at the following unit prices: 12-in. vitrified-pipe sewer, $2.74 per ft.; wye-branches, $2 each; brick manholes, $110 each.

VENTURA, CAL.—Contract for construction of storm-drain system in the Mound district has been awarded to W. M. Ledbetter, Pacific Electric Bdg., Los Angeles.

YUMA, ARIZ.—Contract for construction of sewer system has been awarded to C. H. Julian, San Diego, for $42,339.71.

BRIDGES AND CULVERTS

AUBURN, CAL.—Supervisor J. K. Carrea will build two small concrete bridges near Newcastle. Estimated cost is $500.

BOISE, IDA.—Bids will be received until January 10 by W. T. Dougherty, secretary State Highway Commission, for construction of steel highway bridge across Clarks fork of the Columbia river at Clarks Fork. Bridge will have five 200-ft. spans. Plans from State highway engineer upon deposit of $10.

EUREKA, CAL.—Bids for construction of suspension bridges across Mad river have been rejected because too high.

Bids will be received until January 15 by Fred M. Kay, county clerk, for construction of a highway bridge across Eel river near Alderpoint.

FRESNO, CAL.—Contract for construction of reinforced concrete bridge over Dry creek on Franklin avenue has been awarded to I. H. Teilman, Fresno, for $2348. Other bidders were: Manning Bros., $2950; Adams & Button, $3185; Frederickson & Shannon, $3588; J. P. Williams, $3935.

MERCED, CAL.—J. W. Guest, Jr., and W. H. Halverson were low bidders at $3374 for construction of bridge on Merced-Snelling road. Bids were rejected.

MODESTO, CAL.—Contract for construction of bridge on Cooperstown road near La Grange has been awarded to C. E. Cotton, 16 California street, San Francisco.

County surveyor E. H. Annear is preparing plans for bridge across Snake ravine near La Grange.

NAPA, CAL.—Supervisor Thomas Maxwell has been authorized to construct two small concrete bridges. Total estimated cost is $600.

OAKLAND, CAL.—Plans submitted by Harrington, Howard & Ash, Kansas City, for new bascule bridge across Oakland estuary have been accepted at meeting of Board of Supervisors and representatives of Southern Pacific Co. Estimated cost is $1,800,000.

PORTLAND, ORE.—State Highway Commission has awarded contract for construction of draw-bridge across John Day river to Portland Bridge Co. for $20,999.

Contract for construction of bridge across Goble creek has been awarded to Lindstrom & Ferguson for $4251.50.

SACRAMENTO, CAL.—Duncanson-Harrelson Co., San Francisco, was low bidder and was awarded contract at $32,689, for construction of reinforced concrete bridges on state highway in Marin county. Other bidders were: Newsom & Henning, $46,300; Healy-Tibbitts Construction Co., $46,260; F. Rolandi, $49,500. Engineers' estimate was $47,110.62. State will furnish cement and reinforcing steel, valued at $10,029.50.

SALINAS, CAL.—Bids will be received until January 8 by

Generated on 2024-09-30 01:34 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

T. P. Joy, county clerk, for construction of pile-trestle across Lewis creek.

SAN FRANCISCO, CAL.—Following bids were received by State Board of Harbor Commissioners for construction of steel work for viaduct across Embarcadero at the foot of Market street: Ralston Iron Works, $19,865; Dyer Bros., $22,300; Schrader Iron Works, $23,398. All San Francisco firms.

SAN JOSE, CAL.—Transfer of $49,000 of sewer-bond money to bridge fund has been authorized by voters. This will insure construction of bridge over Coyote creek in place of the one that failed recently.

STOCKTON, CAL.—City budget for coming year will probably include appropriation of $85,000 for construction of bridge on West Washington street.

VENTURA, CAL.—Bids will be received until January 9 by J. B. McCloskey, county clerk, for construction of several reinforced concrete culverts.

WATERVILLE, WASH.—Plans have been prepared and contract will be awarded in 1918 for construction of concrete bridge across Foster creek. Estimated cost is $12,000.

WASHINGTON, D. C.—All bids for construction of two steel bridges at Leupp, Arizona, have been rejected.

IRRIGATION AND WATER SUPPLY

EL CENTRO, CAL.—C. K. Clarke, engineer for the Imperial irrigation district, is preparing plans for a main canal from the siphon-drop on the Laguna project of the U. S. Reclamation Service to the Alamo canal, 17 miles.

Secretary of the Interior Franklin K. Lane has consented to plan for connecting system of Imperial irrigation district with the U. S. Reclamation Service dam at Laguna.

LA CANADA, CAL.—Contract for construction of reinforced concrete reservoir for Valley Water Co. has been awarded to P. H. Ehlers, 5618 Harold way, Los Angeles, for $7500.

MERCED, CAL.—Formation of irrigation district to acquire and extend irrigation system of Crocker-Huffman Land & Water Co. is proposed. C. H. Edwards, H. G. Kelsey, and G. T. Parr are interested.

MODESTO, CAL.—Directors of Modesto irrigation district have authorized P. F. Jones, engineer for district, to proceed with the construction of an intake-gate at the Dallas-Warner reservoir, costing $6800; a drop in lateral No. 1, costing $1800; and a weir in the main canal, costing $1600.

H. E. McAuley was low bidder for construction of drop in main canal of Modesto irrigation district at $1.40 per cu. yd. for hardpan excavation and $11 per cu. yd. for concrete. W. H. Webb bid $1.40 for excavation and $12 for concrete.

OAKDALE, CAL.—J. D. Niman & Sons bid $0.2575 per cu. yd. and Peart Bros., $0.35 per cu. yd. for construction of Temple spillway and Fairbanks lateral for the Oakdale irrigation district. Bids were rejected because too high.

OAKLAND, CAL.—J. M. Ough, 1201 East 12th street, Oakland, was only bidder at $5700 for construction of water system at county tuberculosis hospital at Livermore.

East Bay Water Co. has applied to city council for permission to construct 100,000-gal. wooden tank at 24th Avenue pumping-station.

PRINEVILLE, ORE.—Contract for furnishing 2580 ft. of 28-in. wood-stave pipe to Ochoco irrigation district has been awarded to Portland Wood Pipe Co. for $2.98 per foot.

SAN FRANCISCO, CAL.—State Water Commission has received the following applications for permission to divert water:

Diamond Ridge Water Co., Placerville, water from several streams in addition to the present rights of the company for irrigation. Plans include several storage dams.

W. S. Denman, Jenny Lind, 15 second-feet from Calaveras river. Plans include concrete diversion-dam and seven miles of ditches and flumes. Estimated cost is $5000.

SEATTLE, WASH.—Contract for construction of water-mains on Alki avenue has been awarded to Fiorito Bros., 1630 25th avenue, Seattle, for $57,825.

TRACY, CAL.—Following bids were received for furnishing reinforced concrete pipe to West Side irrigation district; the first figure in each case being for 1650 ft. of pipe, and the second for 1159 ft.: Lindgren Co., $29,000, $24,000; Bos & O'Brien, $18,627, $13,777; Advance Concrete Co., $26,487, $21,222; J. E. Johnson, $21,650, $17,400; A. J. Grier, $22,000, $16,430; Cahill-Vensano Co., $24,140, $18,140.

TWIN FALLS, IDA.—Burns & McDonnell, Kansas City, have presented report recommending construction of water system including 4,000,000-gal. filtration-plant, 24-in. supply-main, and distribution system. Total estimated cost is $372,011.52.

WAITSBURG, WASH.—Bids will be received until January 8 by J. B. Loundagin, city clerk, for construction of water system, including 57,300 ft. of 6-in., 8-in., and 10-in. pipe.

LIGHT, HEAT, AND POWER

ALAMEDA, CAL.—Southern Pacific Co. will construct new power-transmission line for operation of its electric system. Estimated cost is $60,000.

FRESNO, CAL.—Bids will be received until January 7 by W. H. Ryan, city clerk, for construction of electrolier system on Fresno street between G street and the city limits.

HANFORD, CAL.—Contract for construction of electrolier lighting system in business district has been awarded to H. G. Lacey Co., Hanford, for $11,400.

YUBA CITY, CAL.—All bids for construction of oil-burning system at county hospital have been rejected.

RIVER AND HARBOR WORK

BELLINGHAM, WASH.—Contract for construction of substructure for municipal dock has been awarded to K. Sauset, Bellingham, for $38,125.

BLYTHE, CAL.—Plans for levee work prepared by J. C. Allison, Calexico, have been approved. Bond election to raise money will be held in January. Estimated cost of work is $1,250,000.

EL CENTRO, CAL.—Contract for raising the Saiz levee has been awarded by the Imperial irrigation district to Lee Little. Contract for raising the Volcano Lake levee has been awarded to Robert Sherer & Co., Pacific Electric Bdg., Los Angeles. The total cost of these two jobs will be about $335,000.

INDIO, CAL.—Contract for grading for Indio levee district has been awarded to B. E. Minister at $0.325 per cu. yd. for ordinary grading and $1.60 per sq. yd. for grading in mesquite thicket.

Contract for construction of spillway has been awarded to Charles Crawford.

No bids were received for construction of diversion-fence.

LONG BEACH, CAL.—Ross Construction Co., Sacramento, was low bidder at $111,775 for construction of reinforced concrete sea-wall on Seaside boulevard. George Harding, Los Angeles, bid $119,875.

OAKLAND, CAL.—Lease of part of water-front to Union Construction Co. will necessitate expenditure of about $100,000 for dredging.

RICHMOND, CAL.—Contract for dredging turning-basin in outer harbor has been awarded to San Francisco Bridge Co., Nevada Bank Bdg., San Francisco, for about $50,000.

SACRAMENTO, CAL.—Contract for construction of extension of P Street wharf, which was awarded to Edward Clark, has been rescinded.

SAN FRANCISCO, CAL.—Bids will be received until January 21 at U. S. Engineer Office, 401 Custom House, for dredging in Oakland harbor.

Arrangements have been made by which city of Stockton will bear part of expense of dredging in San Joaquin river near Stockton. This will probably permit awarded contract for work to Fred C. Franks, Phelan Bdg., San Francisco, although his bid exceeded the engineer's estimate.

Bids will be received until January 10 by State Board of Harbor Commissioners for construction of pier-shed and bulkhead building on pier No. 3.

State Board of Harbor Commissioners has awarded contract for construction of shed on pier No. 31 to California Construction Co., 74 New Montgomery street, San Francisco, for $72,650.

State Board of Harbor Commissioners has approved plans for addition to building for Wells Fargo & Co. Express. Call for bids will be issued soon.

Following bids were received for dredging 243,440 cu. yd. material in Oakland harbor: American Dredge Co., $0.1687 per cu. yd.; San Francisco Bridge Co., $0.184 per cu. yd. Bids were rejected.

SAN JOSE, CAL.—John W. Williams was low bidder at $953 for construction of wooden revetment along Guadalupe creek on the Almaden road. Bid was rejected because too high.

SANTA BARBARA, CAL.—Mercer-Fraser Co., Eureka, was the only bidder at $9000 for construction of pile dike for bank-protection on Santa Ynez river on Lompoc-Solvan road. Engineer's estimate was $6000.

WASHINGTON, D. C.—River and harbor estimates include the following amounts for Pacific Coast projects: Sacramenta River flood-control, $330,000; Columbia and Willamette rivers, 275,500; Los Angeles harbor, $100,000; Oakland harbor, $100,000; California Debris Commission, $18,000; improvement of Sacramento, San Joaquin, and Mokelumne rivers, $10,500; maintenance of various harbors, $4000.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

RAILROAD WORK

DELTA, UTAH.—Construction of railroad from Delta northerly to Deseret mining district, 22 miles, and from Delta southerly to Kanosh, 48 miles, is proposed. Estimated cost is $1,500,000. W. H. Brereton and Alva Nelson, Provo, are interested.

KINGMAN, ARIZ.—Santa Fe Railroad will make improvements in yards costing $30,000.

LOS ANGELES, CAL.—Plans are being prepared for elimination of grade-crossings in Rose Hill district. Estimated cost is $40,000.

OLYMPIA, WASH.—Following bids were received by State Highway Commission for changing tracks of Seattle, Portland & Spokane Railroad in Skamania county: Porter Bros., $18,673; A. Guthrie & Co., $19,000; Grant Smith & Co., $21,193. All Portland firms.

SAN DIEGO, CAL.—State Railroad Commission has authorized San Diego & Arizona Railroad to purchase holdings of San Diego & Southwestern Railroad.

SAN FRANCISCO, CAL.—Western Pacific Railway is having surveys made for railroad from Crescent Mills to Westwood.

SAN JOSE, CAL.—Proposed incorporation of Willow Glen district south of city has been defeated. This removes obstacle in the way of the construction of the Western Pacific Railway branch between Niles and San Jose.

WASHINGTON, D. C.—Federal appropriation of $7,356,758 for continuing work on the Alaskan railroad is proposed.

BUILDING CONSTRUCTION

BANDON, ORE.—Contract for construction of milk-condensing plant has been awarded to Giebisch & Joplin, Portland, for $100,000.

BAY POINT, CAL.—Plans for first unit of high-school buildings have been completed by J. T. Narbett, Richmond. Total estimated cost is $50,000.

BERKELEY, CAL.—Contract for excavation and concrete and brick work for class C building to be erected for A. J. Cohn has been awarded to F. A. Muller, Syndicate Bdg., Oakland.

BRAWLEY, CAL.—Contract for construction of class C hotel-building has been awarded to Milwaukee Building Co., Wright & Callender Bdg., Los Angeles, for $85,000.

BREMERTON, WASH.—Chris Kuppler, 1309 Seventh avenue, North, Seattle, was low bidder at $20,472 for construction of temporary warehouse at Puget Sound Navy Yard.

COAL CREEK, WASH.—Contract for construction of hotel building has been awarded to William Wills, Crary Bdg., Seattle, for $20,000.

FAIRFIELD, CAL.—G. E. Perry, Jr., 203 Virginia street, Vallejo, is preparing plans for county hospital building and for branch-jail building at Vallejo.

FORT BRAGG, CAL.—Fort Bragg Hotel Co., will construct frame hotel building. Estimated cost is $50,000. W. H. Weeks, 75 Post street, San Francisco, is architect.

FRESNO, CAL.—B. A. Evans, Fresno, was the only bidder at $35,000 for construction of Kirk school. Bid was rejected because too high, and work will be postponed indefinitely.

GARDEN GROVE, CAL.—Contract for construction of hollow-tile packing-house for Garden Grove Citrus Association has been awarded to R. S. Martin, 509 North Marguerita avenue, Alhambra, for $13,270.

GRASS VALLEY, CAL.—Munson Bros. bid $12,950 for construction of city hall and $2750 for construction of jail. Nelson & Forsyth bid $13,479 and $2796. Bids were rejected and work will be postponed until spring.

HANFORD, CAL.—Contract for construction of brick building for Hanford Manufacturing Co. has been awarded to Trewhitt & Shields, Fresno, for $25,000.

KLAMATH FALLS, ORE.—City council is considering plans for completion of court-house. Estimated cost is $60,000.

LOS ANGELES, CAL.—Contract for construction of church-building at Second and St. Louis streets has been awarded to B. F. Yarnell, 227 South Union avenue, Los Angeles, for $14,000.

Contract for construction of class C garage has been awarded by I. A. Sepulveda to Milwaukee Building Co., Wright & Callender Bdg., Los Angeles.

E. C. Thorne, Exchange Bdg., Los Angeles, is preparing plans for brick garage to be erected by C. C. Chapman.

J. J. Frauenfelder, Story Bdg., Los Angeles, is preparing plans for buildings to be erected at Big Bear lake for the Bear Lake Tavern Co. Estimated cost is $60,000.

Bids will be received until January 7 by Board of Supervisors for construction of frame and corrugated-iron warehouse at Palmdale for county road department.

Lee Callahan, 2324 Michigan avenue, Los Angeles, was low bidder at $37,573 for construction of cottage at State hospital at Patton.

Contract for construction of two hotel-buildings on Catalina island for Santa Catalina Island Co. has been awarded to Milwaukee Building Co., Wright & Callender Bdg., Los Angeles.

Contract for construction of reinforced concrete tank-tower for Heywood Bros. has been awarded to Leonardt & Peck, H. W. Hellman Bdg., Los Angeles, for $5000.

Train & Williams, Exchange Bdg., Los Angeles, are preparing plans for 19-story building to be erected by Los Angeles Stock Exchange.

MANTECA, CAL.—Manteca Packing Co. has been incorporated to construct cannery. Estimated cost is $30,000. F. M. Cowell is president of company.

MENLO PARK, CAL.—Contract for construction of library building at Camp Fremont has been awarded to Lindgren Co., Monadnock Bdg., San Francisco. Estimated cost is $15,000.

NAMPA, IDA.—Carnation Creamery Co., Seattle, will construct condensery. Estimated cost is $175,000.

NORTH BEND, ORE.—Buehner Lumber Co. will make improvements at mill costing $160,000.

OLYMPIA, WASH.—Henrickson & Co., Globe Block, Seattle, were low bidders at about $100,000 for construction of school-building.

All bids for construction of State building at Grand Mound have been rejected and work has been postponed until spring.

Contract for completion of Temple of Justice has been awarded by State Capitol Commission to Puget Sound Bridge & Dredging Co., Central Bdg., Seattle, for $245,800, using granite and sandstone.

OAKLAND, CAL.—B. Maybeck, Lick Bdg., San Francisco, is preparing plans for buildings to be constructed at Mills College.

Plans have been completed by H. H. Meyers, Kohl Bdg., San Francisco, for nurses' cottage at county hospital at Livermore. Call for bids will be issued soon by county clerk.

Contract for construction of shed on municipal dock at Clay street has been awarded to C. Christensen & Son, Oakland, for $22,800.

W. T. McGinty & Son, Berkeley, were awarded contract for construction of warehouse for David Bercovich.

Contract for construction of two branch-library buildings has been awarded to R. W. Littlefield, 565 16th street, Oakland, for $47,749. His original bid was $48,997, but this was reduced by changes in plans. Contract for plumbing and heating has been awarded to Robert Dalziel, Jr., for $7985.

Southern Pacific Co. will make improvements in creosoting plant in West Oakland. Estimated cost is $350,000.

American Can Co. will construct plant at Alameda avenue and East 8th street. Estimated cost is $1,250,000.

PHOENIX, ARIZ.—Lescher & Kibbey, Bank of Arizona Bdg., Phoenix, are preparing plans for buildings to be erected at a new townsite by United Verde Extension Mining Co., also plans for water, electric, and sewer systems. Total estimated cost is $2,000,000.

Plans have been completed by V. O. Wallingford, Phoenix, and call for bids will be issued soon for construction of reinforced concrete hospital-building. Estimated cost is $75,000.

RENTON, WASH.—Chicago, Milwaukee & St. Paul Railroad will construct reinforced concrete sub-station. Estimated cost is $75,000.

SACRAMENTO, CAL.—G. S. Hanning was low bidder at $4340 for construction of building for State Mining Bureau at Taft.

Plans for Humboldt State Normal School have been approved and call for bids will probably be issued in March. Estimated cost is $225,000.

Louis Cereghino & Son, 180 Jessie street, San Francisco, were awarded contract at $12,479 for construction of addition to building at State Normal School at Chico. Other bidders were L. G. Bergren & Son, $13,750; G. W. Boxton & Son, $13,974; A. H. Vogt, $14,132; E. Sharp, $15,000; Kerr & McLean, $17,700. Architect's estimate was $14,500.

Plans for exhibition-building at State Fair grounds have been approved by State Agricultural Society, and call for bids will be issued soon.

SAN BERNARDINO, CAL.—Contract for construction of shop-building for Pacific Electric Railway has been awarded to Phillips & LeClair for $15,000.

Santa Fe Railroad will make improvements costing $300,000 at shops and depot.

SAN DIEGO, CAL.—Eugene M. Hoffman, Spreckels Theatre Bdg., San Diego, will have charge of the construction by day-labor of a brick-and-tile garage for James E. Cellumb. Estimated cost is $15,000.

Sisters of Mercy will construct hospital. Estimated cost is $100,000.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838441
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN